

A
Compendium of
Abstracts of
**PUBLISHED
PAPERS**

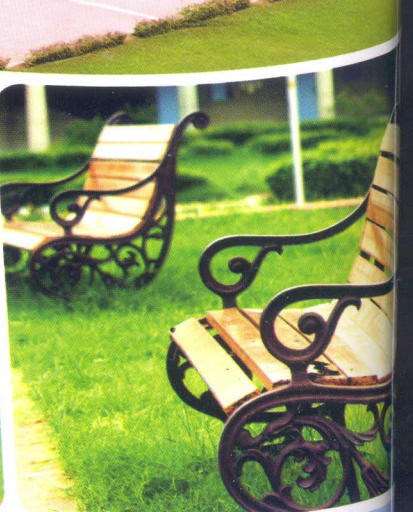
for

**RESEARCH
EXCELLENCE
AWARDS**

1st JANUARY 2018 -
31st DECEMBER 2018

**DELHI TECHNOLOGICAL
UNIVERSITY**

(Formerly Delhi College of Engineering)





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This Compendium of Abstracts of Published Papers for Research Excellence Awards is compiled and edited by Prof. Ashutosh Trivedi and Dr. Ruchika Malhotra, on behalf of Delhi Technological University, as per the submissions made by the first/ corresponding authors. This publication is meant for the internal circulation only and has no commercial purpose.

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Research at the UNIVERSITY

Delhi Technological University has shown discernible excellence in technical education, research and innovations for nearly eight decades and was formerly called Delhi College of Engineering (established as Delhi Polytechnic in 1941 AD). It came into existence to cater the needs of industries for trained technical manpower with practical experience and sound theoretical knowledge. It was set up as a follow up of the historic recommendations of Wood and Abott Committee (1938 AD) near the traditional occupational centre of Delhi namely Kashmere Gate. It comprised of a multi disciplinary institution offering wide ranging programmes in engineering, technology, arts and sculpture, architecture, pharmacy and commerce. In July 2009 it became Delhi Technological University by an act of Delhi.

It is a non-affiliating teaching-cum-research university to facilitate and promote scientific enquiry using state of art equipments for research, protection of intellectual property rights, technology business incubation, product innovation and extension work in science, technology, management and allied areas. The university is currently offering bachelors programme in fifteen disciplines, masters programme in twenty-three specialisations and doctoral programs in the thrust areas of research. There are fifty doctoral fellowships being offered in order to further strengthen the research culture in the campus. The postgraduate programs at the university focus upon VLSI design, software engineering, information systems, microwave and optical communication, thermal, structural, geotechnical, water resources and environmental engineering, computational design, polymer science and so on.

The university is committed to promote research through the scientific priorities right from undergraduate onwards. It has made significant

contributions through the published research in the scholarly journals, patenting, intellectual property rights (IPR), and through an incubation and innovation. The faculty of civil, computer, chemical and polymer, electrical, electronics, environmental, engineering physics and mechanical engineering is involved in to ever increasing number of industrial consultancy projects from the government departments, private organization and sponsored research projects from AICTE, DST, DBT, UGC, CSIR, ICMR, DRDO to name a few. The university provides financial support to the faculty and students for presenting research papers in national and international conferences. There is innovation fund to support inter disciplinary student teams for innovative product development and participation in international design competitions. The university currently houses fifteen startup units. It is a named as a nodal centre for incubation at Delhi supported by the Govt. of NCT of Delhi. The aim of incubation is to serve the society by the technology accelerators and business incubators using the cutting edge research and development at the universities to solve real world problems.

The thrust areas of research at the university are clean energy technologies, material testing, fracture mechanics, rock and geo-mechanics, structural dynamics, CFD, environmental monitoring, future automobile solutions, metro technology and systems, nano-scale devices, biosensors, robotics and machine vision, new and smart materials, conducting polymers, computer aided design, physics of plasma, VLSI design and embedded system, machine learning, software quality and testing, intelligent power systems, broadband on power lines, info security and network management, knowledge and innovation management, socially relevant technologies.

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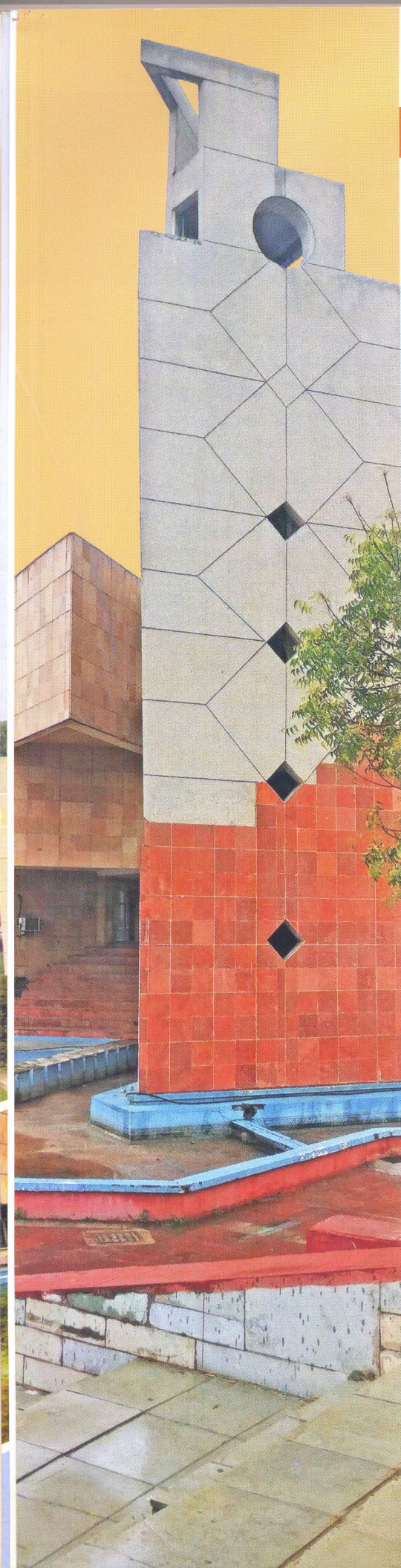
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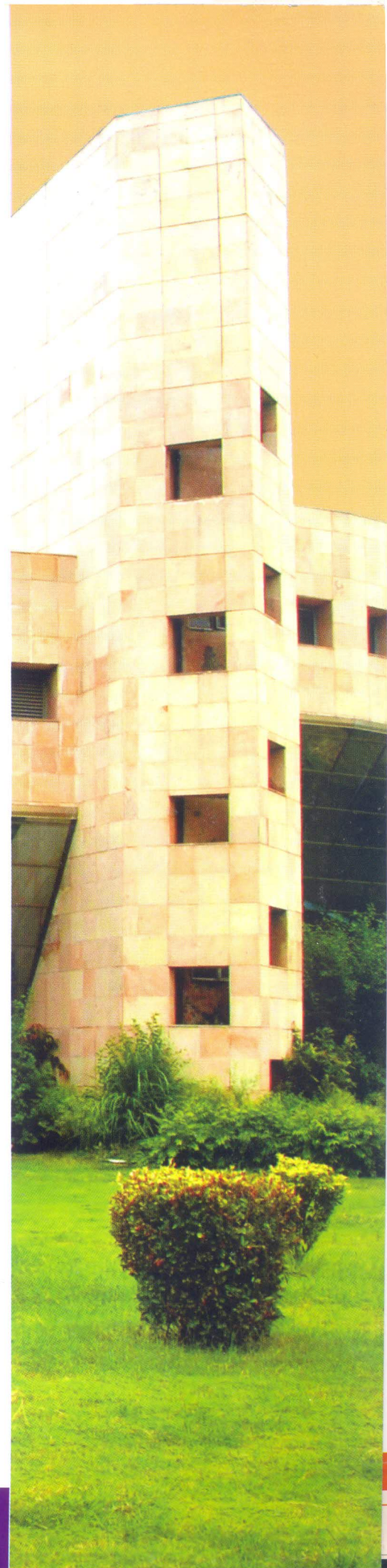
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Research Excellence Award - 2018

From the Desk of The

VICE CHANCELLOR



Delhi Technological University (formerly Delhi College of Engineering) has an illustrious history spanning over 78 years. This premier institution is well known world wide for its outstanding education, research & innovations. Delhi Technological University (DTU) currently offers various inter-disciplinary and industry relevant programs in Science, Technology, Management and allied areas at both the undergraduate and postgraduate level.

In this university we have been actively promoting research and innovations by providing research and innovation environment to the students and faculty that meets the international and global standards. We in DTU are committed to support excellence in research and recognizing those who have achieved this.

Based on this idea to recognize the achievements of faculty and students at DTU, we constituted Research Excellence Awards in 2017. The purpose of the awards is to encourage and promote research culture in all the disciplines of the university and to celebrate the individual excellence in research. The university offers three categories of awards annually namely, ***Outstanding Research Awards, Premier Research Awards and Commendable Research Awards***. The awards are open to all the researchers of DTU. The eligible researcher is encouraged to apply for the publication that is written either under single authorship or jointly with university faculty, research scholar or undergraduate/postgraduate student. The award will be granted to all the researchers who qualify the selection criteria in each category of the award. In 2018, 103 researchers with 82 SCI Indexed publications have been awarded for their publications in the year 2017. This initiative will create an enabling research environment in the university and will enhance the focus on outcome-based research.

With the view of inculcating research and innovation culture at the undergraduate level of DTU, I am happy to announce that recently the university has introduced three new tracks in the undergraduate curriculum: ***Research Track, Product Track and Entrepreneurship Track***. The idea of the tracks is to develop analytical skills and critical thinking among the students

that will enable the students apply knowledge to address the real world situation/problem and find the solutions for them. These research track will enable the student learn appropriate research methodologies and to use them. The course will enable the student to develop a new idea. To summarize, the research experience at the undergraduate level will not only allow the student to learn content, but they will also learn how knowledge is constructed in a particular discipline.

Let us march forward on the path of research excellence and reach new heights of education & research in the years to come. I invite the students and faculty members of DTU to commit themselves for creating research and innovation culture in engineering excellence by their fullest dedication and unconditional commitment to the research and innovation activities and I call them to involve themselves in the service of institution, society, country at large.

I heartily congratulate all the 2019 research excellence award recipients in various disciplines for their outstanding achievement in research and look forward how their contributions will excel our university, and our nation, in the years to come.

Dated: 12.03.2019

Prof. Yogesh Singh
Vice Chancellor

PREFACE

The promotion of invisible collegiums of natural researchers in to the scientific priority, peer review and enquiry is deeply ingrained in the commitments of the university. In its pursuance, an idea to constitute the research excellence award was conceived and envisaged by the Vice Chancellor of the university, Prof. Yogesh Singh, in the year 2016. The university formed a committee that consisted of distinguished academicians and researchers from various departments to frame a guideline for the research excellence award. The committee witnessed several stormy sessions while framing the guidelines and scrutinizing the nominations received for the award. This award consisted of three categories namely outstanding, premier and commendable research. Such a categorization was an extremely difficult task. It doesn't support any claim of superiority of one category of the publications over the other. It is considered an inspirational incentive for the natural researchers to make efforts for the excellence in research. This compendium of abstracts of published papers is a collection of works submitted by the faculty members along with the link to the details on the World Wide Web for the year 2018 and considered for research excellence award. It shall be helpful in inspiring young researchers and students who pursue research in the university.

All the publications eligible for research excellence awards must be the result of author's original contribution published and indexed as per the notification issued by the university. The awards are proposed to be presented to the faculty members of the university annually. The primary goal of the *Outstanding Research Awards* is to recognize faculty who published papers in outstanding category with TRJ impact factor not less than two. The aim of the *Premier Research Awards* is to recognize the faculty who published papers in the reputed journals in primer category with TRJ impact factor not less than one. The goal of the *Commendable Research Awards* is to recognize the faculty who published papers in the reputed journals in commendable category with TRJ impact factor not less than one.

The university congratulates all the members of academic fraternity on receiving the research excellence awards. It hopes to inspire the academic fraternity to work for excellence in research.

On behalf of the research award committee,

Ashutosh Trivedi

Ruchika Malhotra

Delhi Technological University

Research Excellence Award - 2018





DELHI TECHNOLOGICAL UNIVERSITY

Established under Govt. of Delhi Act 6 of 2009
(Formerly Delhi College of Engineering)

BAWANA ROAD, SHAHBAD DAULATPUR, DELHI-42

F.DTU/Council/BOM-AC/Notification/31/2018 | 2443

Dated : 12/9/18

NOTIFICATION

The Guidelines for the Award for Published Paper of the Researchers of Delhi Technological University were approved by the Board of Management in its 21st meeting held on 23.11.2016. In exercise of the powers conferred under sub-section (1) of section 23 of the Delhi Technological University Act, 2009 (Delhi Act 6 of 2009), the Board of Management of the Delhi Technological University in its 28th meeting held on 20th July, 2018 on the basis of suggestions from faculty members vide item number 28.6 revised the Guidelines for the Award for Published Paper of the Researchers of Delhi Technological University as under:-

Guidelines for the Award for Published Paper of the Researchers of Delhi Technological University

The cash awards will be given to researchers in the recognition of importance of the published research work and to motivate the individual excellence in research. The publications considered must be listed in Science Citation Index (SCI) or SCI expanded. The awards will be granted for the journal papers published in each year (1st January - 31st December, published along with Digital Object Identifier (DOI), pagination and year of publication). Only the first author and/ or the corresponding author shall be eligible to apply for the award. A notice will be circulated annually and the entry form consisting published research papers qualifying the selection criteria will be submitted to concern section. The publication made in the journals, which seeks publication fee (article processing charges or open access charges), shall not be considered for cash awards (irrespective of the listing in the publication societies/ houses/ presses specified in the following lists). Amongst the researchers, if one or more of the authors are found with zero contribution, the paper shall not be considered for the award.

1. DEFINITIONS:

- i. **"University"** shall mean Delhi Technological University, Delhi.
- ii. **Paper:** Any publication appearing in journal entitled "....." excluding letters to the editor and the editorials. The publication must be electronically available online with Digital Object Identifier (DOI).
- iii. **Faculty Member of the University:** An individual who is a regular faculty member of the University.
- iv. **University Student:** An individual who is registered for any degree in the Delhi Technological University.

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- v. **Researcher:** An individual who is either a faculty member of the university or a student involved in the research.
- vi. **Author:** An individual who conforms to all of the following criteria:
- a) Made a significant intellectual contribution to the theoretical development, system or experimental design, prototype development, and/or the analysis and interpretation of data associated with the work contained in the article;
 - b) Contributed to drafting the article or reviewing and/or revising it for intellectual content;
 - c) Approved the final version of the article as accepted for publication, including references.
 - d) Contributors who do not meet all of the above criteria (a to c) may be present in the acknowledgment section of the article.
 - e) Omitting an author who contributed to the article or including a person who did not fulfill all of the above requirements is considered a breach of publishing ethics.
 - f) **First Author:** An individual who is either a faculty member of the university or a university student and his name appears first in the list of authors on the title page of the paper.
 - g) **Corresponding Author:** An individual who is either a faculty member of the university or a university student and his name appears first in the list of corresponding authors on the title page of the paper. As a proof of corresponding author, the researcher must provide the screen shot of the tool box of the paper submission system (say, Editorial Manager/ Scholar One) where the name of the author appears on the login page and the title of the paper claimed is listed. If there are more than one corresponding authors then the author whose name appears first on the paper submission system, shall be treated as the corresponding author for the purpose of the award.

2. AWARD CATEGORIES & SELECTION CRITERIA:

A) Outstanding Research Awards

A cash prize of Rs. 5,00,000/- will be awarded along with the certificate of merit.

Selection Criteria: The paper must be a Science Citation Index (SCI) / Social Science Citation Index (SSCI) journal paper of impact factor at least two, and published in the following:

- Nature Journal
- Science
- Harvard Business Review

B) Premier Research Awards

A cash prize of Rs. 1,00,000/- will be awarded along with the certificate of merit. Selection Criteria: The paper must be a journal paper of impact factor at least 3.0, for Institute of Electrical and Electronics Engineers (IEEE) Transactions and one for all others indexed in SCI/ SSCI or SCI expanded and published in the following:

1. Proceedings of Royal Society
2. American Mathematical Society
3. American Physical Society
4. American Society for Civil Engineers (ASCE)
5. American Society for Mechanical Engineers (ASME)
6. IEEE Transactions (TRIF \geq 3.0)
7. Association for Computing Machinery (ACM) Transactions
8. Institute of Civil Engineering Publishing, London
9. Institute of Mechanical Engineering, London
10. American Society of Testing Materials (ASTM)
11. Nature Publishing Group

In addition to the above list, the journals with impact factor equal to or more than thirty (30) will be also be considered for the award.

C) Commendable Research Awards

A cash prize of Rs. 50,000/- will be awarded along with the certificate of merit. Selection Criteria: The paper must be a journal paper of impact factor at least one, indexed in SCI/ SSCI or SCI expanded and published in the following:

1. IEEE Transactions (TRIF $<$ 3)
2. IEEE Journals
3. Springer
4. Elsevier (Science Direct)
5. Oxford University Press
6. Pergamon-Elsevier Science Ltd
7. Cambridge University Press
8. Wiley-Blackwell
9. Blackwell Publishing
10. John Wiley & Sons
11. Institute of Engineering and Technology (IET)
12. Biomedical Central Ltd
13. Massachusetts Institute of Technology (MIT) Press
14. Indiana University Press
15. American Meteorological Society
16. American Physiological Society
17. American Society for Microbiology
18. American Chemical Society
19. American Institute of Physics

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20. Institute of Physics (IOP) Publishing Ltd.
21. Massachusetts Medical Society
22. International Organization for Standardization (IOS) Press
23. Princeton University Press
24. Society of Industrial and Applied Mathematics
25. Proceedings of National Academy of Sciences of USA

In the commendable award category, an author shall be eligible for the cash prize for not more than three papers however the university authors of all the papers shall be eligible for the certificate.

In addition to the above list, SCI and SCI expanded indexed journal not included in the above list having impact factor equal to or more than five shall also be considered for the award.

3. REGULATIONS FOR DIVISION & DISTRIBUTION OF AWARD PRIZE

Case 1: If all the authors are amongst faculty member of the university, then first author will decide the individual author's contribution for the purpose of distribution of prize amount.

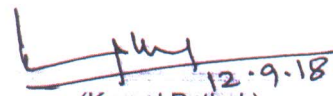
Case 2: If the authors are amongst the faculty member of the university and the university students, then faculty member of the university (whose name appears first in the paper) will decide the individual author's contribution for the purpose of distribution of prize amount.

Case 3: If the first author, corresponding author and other authors are the university students, then the Head of Departments of the first/ corresponding students department (whose name appears first in the paper) will decide the individual author's contribution in consultation with the first author for the purpose of distribution of prize amount.

Case 4: If one (or more) of the author/s is/are external to the university, then the prize amount will be divided by total number of authors and the equal part (one share) of the total prize amount will be disbursed to the university contributors. The prize amount of the external author will be subtracted from the total prize amount.

Case 5: A faculty member of the university or a university student shall be permitted to claim cash prize for a maximum of three papers as author or co-author in the category of commendable research award.

The guidelines shall be implemented for the period of 1st January to 31st December of the respective calendar year.



(Kamal Pathak)

Registrar(In-charge)

Delhi Technological University

Details for Published Papers for

PREMIER RESEARCH AWARDS

1st January, 2018 - 31st December, 2018

S. No.	Authors	Paper Title	Journal with publication details
1.	Satyabrata Adhikari	Structural physical approximation for the realization of the optimal singlet fraction with two measurements	<i>Physical Review A (American Physical Society)</i> , vol. 97, pp. 042344, 2018.
2.	Ashutosh Trivedi and Mukhtiar Singh	L_1 adaptive droop control for AC microgrid with small mesh network	<i>IEEE Transactions on Industrial Electronics (IEEE)</i> , vol. 65, no. 6, pp. 4781-4789, 2018.
3.	Jaipal Saroha, Mukhtiar Singh and Dinesh Kumar Jain	ANFIS-based add-on controller for unbalance voltage compensation in a low-voltage microgrid	<i>IEEE Transactions on Industrial Informatics (IEEE)</i> , vol. 14, no. 12, pp. 5338-5345, 2018.
4.	Prakash Chittora , Alka Singh and Madhusudan Singh	Chebyshev functional expansion based artificial neural network controller for shunt compensation	<i>IEEE Transactions on Industrial Informatics (IEEE)</i> , vol. 14, no. 9, pp. 3792-3800, 2018.
5.	Vijay Gautam and D. Ravi Kumar	Experimental and numerical investigations on springback in V-bending of tailor-welded blanks of interstitial free steel	<i>Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture (Institute of Mechanical Engineering)</i> , vol. 232, no. 12, pp. 2178-2191, 2018.
6.	Vijay Gautam , Vinayak Manohar Raut and D. Ravi Kumar	Analytical prediction of springback in bending of tailor-welded blanks incorporating effect of anisotropy and weld zone properties	<i>Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications (Institute of Mechanical Engineering)</i> , vol. 232, no. 4, pp. 294-306, 2018.

Details for Published Papers for

COMMENDABLE RESEARCH AWARDS

1st January, 2018 - 31st December, 2018

S. No.	Authors	Paper Title	Journal with publication details
1.	Omprakash Yadav, Atul Varshney, Anil Kumar , Ratnesh Kumar Ratnesh, and Mohan Singh Mehata	A ₂ B corroles: Fluorescence signaling systems for sensing fluoride ions	<i>Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy (Elsevier)</i> , vol. 202, pp. 207-213, 2018.
2.	Nidhi Gupta, Deenan Santhiya , Sevi Murugavel, Anil Kumar, Anusha Aditya, Munia Ganguli and Shashank Gupta	Effects of transition metal ion dopants (Ag, Cu and Fe) on the structural, mechanical and antibacterial properties of bioactive glass	<i>Colloids and Surfaces A: Physicochemical and Engineering Aspects (Elsevier)</i> , vol. 538, pp. 393-403, 2018.
3.	Manish Jain and Sharad Kumar Gupta	Desulfurization of FCC gasoline by using spiral wound pervaporation module: Removal of different types of sulfur containing species	<i>Chemical Engineering Research and Design (Elsevier)</i> , vol. 136, pp. 105-118, 2018.
4.	Ram Singh and Babita Veer	Hydrogels: Promising energy storage materials	<i>ChemistrySelect (Wiley)</i> , vol. 3, pp. 1309-1320, 2018.
5.	Ram Singh , Surybala Shahi and Geetanjali	Chemical degradation of poly(bisphenol A carbonate) waste materials: A review	<i>ChemistrySelect (Wiley)</i> , vol. 3, pp. 11957– 11962, 2018.
6.	Manjeet Malik and Raminder Kaur	Mechanical and thermal properties of castor oil-based polyurethane adhesive: Effect of TiO ₂ filler	<i>Advances in Polymer Technology (Wiley)</i> , vol. 37, no. 1, pp. 24-30, 2018.
7.	Manjeet Malik and Raminder Kaur	Influence of aliphatic and aromatic isocyanates on the properties of poly (ether ester) polyol based PU adhesive system	<i>Polymer Engineering & Science (Wiley)</i> , vol. 58, no. 1, pp. 112-117, 2018.
8.	Manjeet Malik and Raminder Kaur	Synthesis of NIPU by the carbonation of canola oil using highly efficient 5, 10, 15-tris (pentafluorophenyl) corrolato-manganese (III) complex as novel catalyst	<i>Polymers for Advanced Technologies (Wiley)</i> , vol. 29, no. 3, pp.1078-1085, 2018.

S. No.	Authors	Paper Title	Journal with publication details
9.	Chandra Mohan Srivastava and Roli Purwar	Fabrication of 3D Self-Assembled Nonmulberry Antheraea Mylitta (tasar) Fibroin Nonwoven Mats for Wound Dressing Applications	<i>Macromolecular Research (Springer)</i> , vol. 26, no. 10, pp. 872-881, 2018.
10.	Dhirendra Brahmchari, Akhilesh K. Verma and Saurabh Mehta	Regio- and Stereoselective Synthesis of Isoindolin-1-ones through BuLi-mediated Iodoaminocyclization of 2-(1-Alkynyl) benzamides	<i>The Journal of Organic Chemistry (American Chemical Society)</i> , vol. 83, pp. 3339-3347, 2018.
11.	Mamata Sahu, Anjana Gupta and Aparna Mehra	Acceptably consistent incomplete interval-valued intuitionistic multiplicative preference relations	<i>Soft Computing (Springer)</i> , vol. 22, no. 22, pp. 7463-7477, 2018.
12.	Chandra Prakash Singh and Milan Srivastava	Viscous cosmology in new holographic dark energy model and the cosmic acceleration	<i>European Physical Journal C (Springer)</i> , vol. 78, no. 3, pp. 190, 2018.
13.	Chandra Prakash Singh and Ajay Kumar	Ricci dark energy model with bulk viscosity	<i>European Physical Journal Plus (Springer)</i> , vol. 133, pp. 312, 2018.
14.	Milan Srivastava and Chandra Prakash Singh	New holographic dark energy model with constant bulk viscosity in modified $f(R,T)$ gravity theory	<i>Astrophysics and Space Science (Springer)</i> , vol. 363, no. 6, pp.117, 2018.
15.	Minakshi Dhamija, Ram Pratap and Naokant Deo	Approximation by Kantorovich form of modified Szasz-Mirakyan operators	<i>Applied Mathematics and Computation (Elsevier)</i> , vol. 317, pp. 109-120, 2018.
16.	Gifty Malhotra, R. Srivastava and H.C. Taneja	Quadratic approximation of the slow factor of volatility in a multifactor stochastic volatility model	<i>Journal of Futures Markets (Wiley)</i> , vol. 38, no. 5, pp. 607-624, 2018.
17.	Ritu Goel , H. C. Taneja and Vikas Kumar	Measure of entropy for past lifetime and k -record statistics	<i>Physica A: Statistical Mechanics and its Applications (Elsevier)</i> , vol. 503, pp. 623-631, 2018.
18.	Pooja Chauhan, Ajeet Kumar and Yogita Kalra	Mid-infrared broadband supercontinuum generation in a highly nonlinear rectangular core chalcogenide photonic crystal fiber	<i>Optical Fiber Technology (Elsevier)</i> , vol. 46, pp. 174-178, 2018.

S. No.	Authors	Paper Title	Journal with publication details
19.	Priti Siwach, Ajeet Kumar and Than Singh Saini	Broadband supercontinuum generation spanning 1.5–13 μm in $\text{Ge}_{11.5}\text{As}_{24}\text{Se}_{64.5}$ based chalcogenide glass step index optical fiber	<i>Optik (Elsevier)</i> , vol. 156, pp. 564–570, 2018.
20.	Aditya Jain, Amrish K. Panwar and A.K. Jha	Significant improvement in morphological, dielectric, ferroelectric and piezoelectric characteristics of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Ti}_{0.9}\text{Zr}_{0.1}\text{O}_3\text{-BaNb}_2\text{O}_6$ nanocomposites	<i>Journal of Materials Science: Materials in Electronics (Springer)</i> , vol. 29, no. 22, pp. 19086-19098, 2018.
21.	Aditya Jain, Amrish K. Panwar and A.K. Jha	Significant enhancement in structural, dielectric, piezoelectric and ferromagnetic properties of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3\text{-CoFe}_2\text{O}_4$ multiferroic composites	<i>Materials Research Bulletin (Elsevier)</i> , vol. 100, pp. 367-376, 2018.
22.	Rakesh Saroha, Amrish K. Panwar , Anurag Gaur, Yogesh Sharma, Vinay Kumar and Pawan K. Tyagi	Electrochemical studies of novel olivine-layered ($\text{LiFePO}_4\text{-Li}_2\text{MnO}_3$) dual composite as an alternative cathode material for Lithium-ion batteries	<i>Journal of Solid State Electrochemistry (Springer)</i> , vol. 22, no.8, pp. 2507-2513, 2018.
23.	Nisha Deopa and A.S. Rao	Spectroscopic studies of single near ultraviolet pumped Tb^{3+} doped Lithium Lead Alumino Borate glasses for green lasers and tricolour w-LEDs	<i>Journal of Luminescence (Elsevier)</i> , vol. 194, pp. 56-63, 2018.
24.	Ritu Sharma and A.S. Rao	Photoluminescence studies of Sm^{3+} ions doped Zinc Lead Tungsten Tellurite glasses for Reddish-Orange photonic device applications	<i>Optical Materials (Elsevier)</i> , vol. 84, pp. 375-382, 2018.
25.	Ritu Sharma and A.S. Rao	Photoluminescence investigations on Dy^{3+} ions doped Zinc Lead Tungsten Tellurite glasses for Optoelectronic devices	<i>Journal of Non-Crystalline Solids (Elsevier)</i> , vol. 495, pp. 85-94, 2018.
26.	Kaushal Jha and M. Jayasimhadri	Effective sensitization of Eu^{3+} and energy transfer in $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT glasses for CuPc based solar cell and w-LED applications	<i>Journal of Luminescence (Elsevier)</i> , vol. 194, pp. 102-107, 2018.

S. No.	Authors	Paper Title	Journal with publication details
27.	Mukesh K. Sahu, M. Jayasimhadri , Kaushal Jha, B. Sivaiah, A.S. Rao and D. Haranath	Synthesis and enhancement of photoluminescent properties in spherical shaped Sm ³⁺ /Eu ³⁺ co-doped NaCaPO ₄ phosphor particles for w-LEDs	<i>Journal of Luminescence (Elsevier)</i> , vol. 202, pp. 475-483, 2018.
28.	Sumandeep Kaur, A.S. Rao, M. Jayasimhadri	Enhanced red down-conversion luminescence and high color purity from flux assisted Eu ³⁺ doped calcium aluminozincate phosphor	<i>Journal of Luminescence (Elsevier)</i> , vol. 202, pp. 461-468, 2018.
29.	Mohan Singh Mehata	Spectral and time-resolved properties of photoinduced hydroxyquinolines doped thin polymer films	<i>Optical Materials (Elsevier)</i> , vol. 75, pp. 751-756, 2018.
30.	Ratneshwar Kumar Ratnesh and Mohan Singh Mehata	Tunable single and double emission semiconductor nanocrystal quantum dots: A multianalyte sensor	<i>Methods and Applications in Fluorescence (IOPScience)</i> , vol. 6, no. 3, pp. 201-210, 2018.
31.	Monika Yadav , Suresh C. Sharma and Devki Nandan Gupta	Electron acceleration by a relativistic electron plasma wave in inverse free electron laser mechanism	<i>IEEE Transactions on Plasma Science (IEEE)</i> , vol. 46, no. 7, pp. 2521-2527, 2018.
32.	Kamal Arora and Nitin K. Puri	Electrophoretically deposited nanostructured PdO thin film for room temperature amperometric H ₂ sensing	<i>Vacuum (Elsevier)</i> , vol. 154, pp. 302-308, 2018.
33.	Deepika Sandi, Saurabh Srivastava, B. D. Malhotra, S. C. Sharma and Nitin K. Puri	Biofunctionalized tungsten trioxide-reduced graphene oxide nanocomposites for sensitive electrochemical immunosensing of cardiac biomarker	<i>Journal of Alloys and Compounds (Elsevier)</i> , vol. 763, pp.102-110, 2018.
34.	Vinay Kumar and Pawan K. Tyagi	Potential application of multi-walled carbon nanotubes/activated carbon/bamboo charcoal for efficient alcohol sensing	<i>Journal of Alloys and Compounds (Elsevier)</i> , vol. 767, pp. 215-222, 2018.

S. No.	Authors	Paper Title	Journal with publication details
35.	Lucky Krishnia and Pawan K. Tyagi	Growth and characterization of polycrystalline diamond films on silicon using sugarcane bagasse as carbon precursor at atmospheric pressure by thermal chemical vapor deposition	<i>Diamond and Related Materials (Elsevier)</i> , vol. 87, pp.18-26, 2018.
36.	Reetu Kumari, Pawan K. Tyagi and Nitin K. Puri	Electron irradiation induced wall-to-wall joining of multiwalled carbon nanotubes	<i>Applied Surface Science (Elsevier)</i> , vol. 453, pp.153-158, 2018.
37.	Reetu Kumari, Pawan K. Tyagi and Nitin K. Puri	Work function and electrical properties of individual multiwalled carbon nanotube: Influenced by nature of catalyst and substrate	<i>Applied Physics A: Materials Science & Processing (Springer)</i> , vol. 124, no. 7, pp. 466, 2018.
38.	Lucky Krishnia, Brajesh S. Yadav, Umesh Palnitkar, P.V. Satyam, Bipin Kumar Gupta, Nikhil A. Koratkar and Pawan K. Tyagi	As-pyrolyzed sugarcane bagasse possessing exotic field emission properties	<i>Applied Surface Science (Elsevier)</i> , vol. 443, pp.184-190, 2018.
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41.	Ajay Kumar, M.M. Tripathi and Rishu Chaujar	Reliability issues of In ₂ O ₅ /Sn gate electrode recessed channel MOSFET: Impact of interface trap charges and temperature	<i>IEEE Transactions on Electron Devices (IEEE)</i> , vol. 65, no. 3, pp. 860-863, 2018.
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S. No.	Authors	Paper Title	Journal with publication details
43.	Ajay Kumar, M.M. Tripathi and Rishu Chaujar	Comprehensive analysis of sub-20 nm black phosphorus based junctionless-recessed channel MOSFET for analog/RF applications	<i>Superlattices and Microstructures (Elsevier)</i> , vol. 116, pp. 171-180, 2018.
44.	Ajay Kumar, M.M. Tripathi and Rishu Chaujar	Ultra-low power dielectric modulated nano-gap embedded sub-20nm TGRC-MOSFET for biosensing application	<i>Journal of Computational Electronics (Springer)</i> , vol. 17, no. 4, pp. 1807-1815, 2018.
45.	Rahul Pandey and Rishu Chaujar	Rear contact silicon solar cells with a-SiC _X :H based front surface passivation for near-ultraviolet radiation stability	<i>Superlattices and Microstructures (Elsevier)</i> , vol. 122, pp. 111-123, 2018.
46.	Kavita Rani Segwal and Suresh C. Sharma	Current Driven Low Frequency Electrostatic Waves in a Collisional Strongly Coupled Magnetized Dusty Plasma	<i>IEEE Transactions on Plasma Science (IEEE)</i> , vol. 46, no. 4, pp. 797-805, 2018.
47.	Ravi Gupta, Neha Gupta and Suresh C. Sharma	Modeling to study the role of catalyst in the formation of graphitic shells during carbon nanofiber growth subjected to reactive plasma	<i>Physics of Plasmas (AIP)</i> , vol. 25, no. 4, pp. 043504, 2018.
48.	Umang Sharma and Suresh C. Sharma	A parametric study to unravel the alignment mechanism of carbon nanotubes during its plasma-assisted growth	<i>Physics of Plasmas (AIP)</i> , vol. 25, no. 10, pp. 103509, 2018.
49.	Ajay Gahlot and Suresh C. Sharma	Resonant decay of a Langmuir wave in presence of dust grains in cylindrical plasma	<i>Contributions to Plasma Physics (Wiley)</i> , vol. 58, no. 4, pp. 302-310, 2018.
50.	Kavita Rani Segwal and Suresh C. Sharma	Theoretical modeling of an ion beam driven kelvin helmholtz instability in a plasma cylinder having negatively charged dust grains	<i>IEEE Transactions on Plasma Science (IEEE)</i> , vol. 46, no. 4, pp. 775-781, 2018.
51.	Jyotsna Panwar and Suresh C. Sharma	Terahertz radiation emission using plasma filled dielectric liner with the effects of pre-modulated relativistic electron beam	<i>Contributions to Plasma Physics (Wiley)</i> , vol. 58, no. 9, pp. 917-924, 2018.

S. No.	Authors	Paper Title	Journal with publication details
52.	Neha Gupta and Suresh C. Sharma	Investigations on the plasma enabled growth of vertical graphene sheets on CNT surface	<i>Physics of Plasmas (AIP)</i> , vol. 25, no. 7, pp. 073509, 2018.
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54.	Vinod Singh , Shivani Dhall, Akshey Kaushal and Bodh R. Mehta	Room temperature response and enhanced hydrogen sensing in size selected Pd-C core-shell nanoparticles: Role of carbon shell and Pd-C interface	<i>International Journal of Hydrogen Energy (Elsevier)</i> , vol. 43, no. 2, pp. 1025-1033, 2018.
55.	Reena Reena, Yogita Kalra and Ajeet Kumar	Ellipsoidal all-dielectric Fano resonant core-shell metamaterials	<i>Superlattices and Microstructures (Elsevier)</i> , vol. 118, pp. 205-212, 2018.
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57.	Richa Sharma and Asmita Das	IL-2 mediates NK cell proliferation but not hyperactivity	<i>Immunologic Research (Springer)</i> , vol. 66, no. 1, pp. 151-157, 2018.
58.	Shine Augustine, Amish G. Joshi, Birendra Kumar Yadav, Anurag Mehta, Pragati Kumar, Venkatesan Renugopalakrishnan and Bansi Dhar Malhotra	An emerging nanostructured molybdenum trioxide-based biocompatible sensor platform for breast cancer biomarker detection	<i>MRS Communications (Cambridge)</i> , vol. 8, no. 3, pp. 668-679, 2018.
59.	Deshika Kohli , Paraeswaran Chidambaranathan, J. Prasanth Tej Kumar, Ashish Kumar Singh, Anil Kumar, Anil Sirohi, K. Subramaniam, Ramamurthy Srinivasan, Navneeta Bharadvaja and Pradeep K. Jain	Host-mediated RNAi of a Notch-like receptor gene in <i>Meloidogyne incognita</i> induces nematode resistance	<i>Parasitology (Cambridge)</i> , vol. 145, no. 14, pp. 1896-1906, 2018.

S. No.	Authors	Paper Title	Journal with publication details
60.	Mansi Punjabi , Navneeta Bharadvaja, Archana Sachdev and Veda Krishnan	Molecular characterization, modeling, and docking analysis of late phytic acid biosynthesis pathway gene, inositol polyphosphate 6-/3-/5-kinase, a potential candidate for developing low phytate crops	<i>3 Biotech (Springer)</i> , vol. 8, no. 8, pp. 344, 2018.
61.	Arpita Roy and Navneeta Bharadvaja	Effect of various culture condition on shoot multiplication and GC-MS analysis of <i>Plumbago zeylanica</i> accessions for Plumbagin production	<i>Acta Physiologiae Plantarum (Springer)</i> , vol. 40, no. 11, pp. 190, 2018.
62.	Richa Virmani, Yogendra Singh and Yasha Hasija	GroEL mediates folding of <i>Bacillus anthracis</i> Serine/Threonine protein kinase, PrkC	<i>Indian Journal of Microbiology (Springer)</i> , vol. 58, no. 4, pp. 520-524, 2018.
63.	Richa Virmani, Yasha Hasija and Yogendra Singh	Effect of homocysteine on biofilm formation by Mycobacteria	<i>Indian Journal of Microbiology (Springer)</i> , vol. 58, no. 3, pp. 287-293, 2018.
64.	Rajkumar Chakraborty, Himani Gupta, Razia Rahman and Yasha Hasija	<i>In Silico</i> analysis of nsSNPs in ABCB1 gene affecting breast cancer associated protein P-glycoprotein (P-gp)	<i>Computational Biology and Chemistry (Elsevier)</i> , vol. 77, pp. 430-441, 2018.
65.	Amit Kumar Shrivastava and K. Seshagiri Rao	Physical Modeling of Shear Behavior of Infilled Rock Joints Under CNL and CNS Boundary Conditions	<i>Rock Mechanics and Rock Engineering (Springer)</i> , vol. 51, no. 1, pp. 101-118, 2018.
66.	Akshi Kumar , Himanshu Ahuja, Nikhil Kumar Singh, Deepak Gupta, Ashish Khanna and Joel J.P.C. Rodrigues	Supported matrix factorization using distributed representations for personalised recommendations on twitter	<i>Computers & Electrical Engineering (Elsevier)</i> , vol. 71, pp. 569-577, 2018.
67.	Divyashikha Sethia , Daya Gupta and Huzur Saran	NFC secure element-based mutual authentication and attestation for IoT access	<i>IEEE Transaction of Consumer Electronics (IEEE)</i> , vol. 64, no. 8, pp. 470-479, 2018.
68.	Rahul Katarya	Movie recommender system with metaheuristic artificial bee	<i>Neural Computing and Applications (Springer)</i> , vol. 30, no. 6, pp. 1983-1990, 2018.

S. No.	Authors	Paper Title	Journal with publication details
69.	Rahul Katarya and Om Prakash Verma	Efficient music recommender system using context graph and particle swarm	<i>Multimedia Tools and Applications (Springer)</i> , vol. 77, no. 2, pp. 2673-2687, 2018.
70.	Rahul Katarya and Om Prakash Verma	Recommender system with grey wolf optimizer and FCM	<i>Neural Computing and Applications (Springer)</i> , vol. 30, no. 5, pp. 1679-1687, 2018.
71.	Ruchika Malhotra	An extensive analysis of search-based techniques for predicting defective classes	<i>Computers & Electrical Engineering (Elsevier)</i> , vol. 71, pp. 611-626, 2018.
72.	Ruchika Malhotra and Megha Khanna	Particle swarm optimization-based ensemble learning for software change prediction	<i>Information and Software Technology (Elsevier)</i> , vol. 102, pp. 65-84, 2018.
73.	Ajay Kumar , Samarth Singh, Balak Tiwari, M.M. Tripathi and Rishu Chaujar	Radiation analysis of N-channel TGRC-MOSFET: An X-Ray dosimeter	<i>IEEE Transactions on Electron Devices (IEEE)</i> , vol. 99, pp. 1-7, 2018.
74.	Manoj Badoni, Alka Singh , Vijay P. Singh and Ravi Nath Tripathi	Grid interfaced solar photovoltaic system using ZA-LMS based control algorithm	<i>Electric Power Systems Research (Elsevier)</i> , vol. 160, pp. 261-272, 2018.
75.	Amritesh Kumar and Vishal Verma	Performance enhancement of single-phase grid-connected PV system under partial shading using cascaded multilevel converter	<i>IEEE Transactions on Industry Applications (IEEE)</i> , vol. 54, no. 3, pp. 2665-2676, 2018.
76.	Imran Ahmad Quadri , Suman Bhowmick and Dheeraj Joshi	A comprehensive technique for optimal allocation of distributed energy resources in radial distribution systems	<i>Applied Energy (Elsevier)</i> , vol. 211, pp. 1245-1260, 2018.
77.	Imran Ahmad Quadri , Suman Bhowmick and Dheeraj Joshi	Multi-objective approach to maximise loadability of distribution networks by simultaneous reconfiguration and allocation of distributed energy resources	<i>IET Generation Transmission & Distribution (IET)</i> , vol. 12, no. 21, pp. 5700-5712, 2018.
78.	Anirudh Dube, M. Rizwan and Maje Jamil	New approach for maximizing generation and optimal utilization of available space for solar PV system	<i>Journal of Renewable and Sustainable Energy (AIP)</i> , vol. 10, no. 6, pp. 063703, 2018.

S. No.	Authors	Paper Title	Journal with publication details
79.	Gulnar Perveen, M. Rizwan and Nidhi Goel	Intelligent model for solar energy forecasting and its implementation for solar photovoltaic applications	<i>Journal of Renewable and Sustainable Energy (AIP)</i> , vol. 10, no. 6, pp. 063702, 2018.
80.	Neelu Nagpal, Vijayant Agarwal and Bharat Bhushan	A real-time state-observer-based controller for a stochastic robotic manipulator	<i>IEEE Transactions on Industry Applications (IEEE)</i> , vol. 54, no. 2, pp.1806-1822, 2018.
81.	Nikita Gupta and Rachana Garg	Algorithm for islanding detection in photovoltaic generator network connected to low-voltage grid	<i>IET Generation Transmission & Distribution (IET)</i> , vol. 12, no. 10, pp. 2280-2287, 2018.
82.	Nikita Gupta and Rachana Garg	Design, development, and reliability assessment of dual output converters for SPV based DC nanogrid	<i>Journal of Renewable and Sustainable Energy (AIP)</i> , vol. 10, no. 2, pp. 025502, 2018.
83.	Prakash Chittora, Alka Singh and Madhusudan Singh	Simple and efficient control of DSTATCOM in three-phase four-wire polluted grid system using MCCF-SOGI based controller	<i>IET Generation Transmission & Distribution (IET)</i> , vol. 12, no. 5, pp. 1213-1222, 2018.
84.	Priyanka Chaudhary and M. Rizwan	Energy management supporting high penetration of solar photovoltaic generation for smart grid using solar forecasts and pumped hydro storage system	<i>Renewable Energy (Elsevier)</i> , vol. 118, pp. 928-946, 2018.
85.	Priyanka Chaudhary and M. Rizwan	Hybrid control approach for PV/FC fed voltage source converter tied to grid	<i>International Journal of Hydrogen Energy (Elsevier)</i> , vol. 43, no. 14, pp. 6851-6866, 2018.
86.	Priyanka Chaudhary and M. Rizwan	Voltage regulation mitigation techniques in distribution system with high PV penetration: A review	<i>Renewable and Sustainable Energy Reviews (Elsevier)</i> , vol. 82, pp. 3279-3287, 2018.
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88.	Alok Kumar Singh, Pragati Kumar and Raj Senani	Fully-differential current-mode higher order filters using all grounded passive elements	<i>AEU-International Journal of Electronics and Communications (Elsevier)</i> , vol. 97, pp. 102-109, 2018.

S. No.	Authors	Paper Title	Journal with publication details
89.	Deva Nand and Neeta Pandey	New configuration for OFCC-based CM SIMO filter and its application as shadow filter	<i>Arabian Journal for Science and Engineering (Springer)</i> , vol. 43, no. 6, pp. 3011-3022, 2018.
90	Lalit Goswami , Rajeshwari Pandey and Govind Gupta	Epitaxial growth of GaN nanostructure by PA-MBE for UV detection application	<i>Applied Surface Science (Elsevier)</i> , vol. 449, pp.186-192, 2018.
91	Gurumurthy Komanapalli, Neeta Pandey and Rajeshwari Pandey	New realization of third order sinusoidal oscillator using single OTRA	<i>AEU-International Journal of Electronics and Communications (Elsevier)</i> , vol. 93, pp. 182-190, 2018.
92	Sirish Oruganti, Neeta Pandey and Rajeshwari Pandey	Electronically tunable high gain current-mode instrumentation amplifier	<i>AEU-International Journal of Electronics and Communications (Elsevier)</i> , vol. 95, pp. 16-23, 2018.
93	Prateek Pahalwan, Prateek Tripathi, Prashant Gola, Neeta Pandey and Deva Nand	Programmable gain amplifier using operational floating current conveyors	<i>AEU-International Journal of Electronics and Communications (Elsevier)</i> , vol. 90, pp. 163 – 170, 2018.
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95	Shubham Negi, Poornima Mittal and Brijesh Kumar	Impact of different layers on performance of OLED	<i>Microsystem Technologies: Micro- and Nanosystems Information Storage and Processing Systems (Springer)</i> , vol. 24, pp. 1-9, 2018.
96	Rajiv Kapoor , Rashmi Gupta, Le Hoang Son, Sudan Jha and Raghvendra Kumar	Boosting performance of power quality event identification with KL Divergence measure and standard deviation	<i>Measurement (Elsevier)</i> , vol. 126, pp. 134-142, 2018.
97	Rajiv Kapoor , Rashmi Gupta, Le Hoang Son, Sudan Jha and Raghvendra Kumar	Detection of power quality event using histogram of oriented gradients and support vector machine	<i>Measurement (Elsevier)</i> , vol. 120, pp. 52-75, 2018.

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98	Chitrakshi and Anil Kumar Haritash	Hydrogeochemical characterization and suitability appraisal of groundwater around stone quarries in Mahendragarh, India	<i>Environmental Earth Sciences (Springer)</i> , vol. 77, no. 6, pp. 252, 2018.
99	Amrit Kumar and R.K. Mishra	Human Health Risk Assessment of Major Air Pollutants at Transport Corridors of Delhi, India	<i>Journal of Transport & Health (IOPScience)</i> , vol. 10, pp. 132-143, 2018.
100	Himanshu Aggarwal and Dinesh Kumar Vishwakarma	Covariate conscious approach for gait recognition based upon zernike moment invariants	<i>IEEE Transactions on Cognitive and Developmental Systems (IEEE)</i> , vol. 10, no. 2, pp. 397-407, 2018.
101	Sakshi Dhall , Saibal K. Pal and Kapli Sharma	Cryptanalysis of image encryption scheme based on a new 1D chaotic system	<i>Signal Processing (Elsevier)</i> , vol. 146, pp. 22-32, 2018.
102	Seba Susan and Madasu Hanmandlu	Color texture recognition by color information fusion using the non-extensive entropy	<i>Multidimensional Systems and Signal Processing (Springer)</i> , vol. 29, no. 4, pp. 1269-1284, 2018.
103	Ashok Kumar Yadav, Amit Pal and Alok Manas Dubey	Experimental studies on utilization of Prunus armeniaca L.(wild apricot) biodiesel as an alternative fuel for CI engine	<i>Waste and Biomass Valorization (Springer)</i> , vol. 9, no. 10, pp.1961-1969, 2018.
104	Anuj Kumar Jain , Vikas Rastogi and Atul Kumar Agarwal	A novel approach to study effects of asymmetric stiffness on parametric instabilities of multi-rotor-system	<i>Journal of Sound and Vibration (Elsevier)</i> , vol. 413, pp. 159-172, 2018.
105	Harwinder Singh and R.S. Mishra	Performance evaluation of the supercritical organic rankine cycle (SORC) integrated with large scale solar parabolic trough collector (SPTC) system: An exergy energy analysis	<i>Environmental Progress & Sustainable Energy (Wiley)</i> , vol. 37, no. 2, pp. 891-899, 2018.
106	Mohit Mittal and Rajiv Chaudhary	Effect of fiber content on thermal behavior and viscoelastic properties of PALF/Epoxy and COIR/Epoxy composites	<i>Materials Research Express (IOPScience)</i> , vol. 5, no. 12, pp. 125305, 2018.

S. No.	Authors	Paper Title	Journal with publication details
107	Naushad Ahmad Ansari , Abhishek Sharma, Yashvir Singh	Performance and emission analysis of a diesel engine implementing polanga biodiesel and optimization using Taguchi method	<i>Process Safety and Environmental Protection (Elsevier)</i> , vol. 120, pp. 146-154, 2018.
108	Pravin Kumar , Faisal Ahmed, Rajesh Kumar Singh and Prerna Sinha	Determination of hierarchical relationships among sustainable development goals using interpretive structural modelling	<i>Environment Development and Sustainability (Springer)</i> , vol. 20, no. 5, pp. 2119–2137, 2018.
109	Umakant Sahoo, Rajesh Kumar , Surinder K. Singh and Arunabh K. Tripathi	Energy, exergy, economic analysis and optimization of polygeneration hybrid solar-biomass system	<i>Applied Thermal Engineering (Elsevier)</i> , vol. 145, pp. 685-692, 2018.
110	Abdul Khaliq, Rajesh Kumar and Esmail M.A. Mokheimer	Investigation on a solar thermal power and ejector-absorption refrigeration system based on first and second law analyses	<i>Energy (Elsevier)</i> , vol. 164, pp. 1030-1043, 2018.
111	Roop Lal and R. C. Singh	Experimental comparative study of chrome steel pin with and without chrome plated cast iron disc in situ fully flooded interface lubrication	<i>Surface Topography: Metrology and Properties (IOPScience)</i> , vol. 6, no. 3, pp. 035001, 2018.



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Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. O. Yadav, A. Varshney, **A. Kumar**, R.K. Ratnesh, and M.S. Mehata, "A₂B corroles: Fluorescence signaling systems for sensing fluoride ions", *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, vol. 202, pp. 207-213, 2018, Impact Factor: 2.880.

A₂B Corroles: Fluorescence Signaling Systems for Sensing Fluoride Ions

*Omprakash Yadav, Atul Varshney, **Anil Kumar***, Ratnesh Kumar Ratnesh, and Mohan Singh Mehata*

Abstract: Four free base corroles, 1–4, A₂B, (where A = nitrophenyl, and B = pentafluorophenyl, 2, 6-difluoro, 3, 4, 5-trifluoro and 4-carboxymethylphenyl group) have been synthesized, characterized and demonstrated as excellent chemosensor for the detection of fluoride ions selectively in toluene solution. The reported corroles shows highest quantum yield in free base form of porphyrinoid systems so far. All these corrole, 1–4, have the excellent ability to sense fluoride ion. Cumulative effect of static and dynamic factors is responsible for the quenching of fluorescence which indicates the detection of fluoride ion in solution.

For details refer to <https://doi.org/10.1016/j.saa.2018.05.051>

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Dr. Deenan Santhiya is an Assistant Professor at the Discipline of Applied Science, Department of Applied Chemistry, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. She received her Master's and Doctorate degree from the Department of Metallurgy (Currently Materials Engineering Dept.) under Mechanical Division, Indian Institute of Science, Bangalore. She has received Prof. R.M. Mallya Processing Award for the best Ph.D. thesis of the year 2002. She has completed a DST project entitled "Biophysical studies on siRNA-cationic agent nano complexes for gene delivery applications" (2011-2014). She has published several reputed research articles affiliated with Delhi Technological University so far. Her research interests are in the field of Nano Biotechnology and Gene delivery applications.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. N.Gupta, **D. Santhiya**, S. Murugavel, A. Kumar, A. Aditya, M. Ganguli and S. Gupta, "Effects of transition metal ion dopants (Ag, Cu and Fe) on the structural, mechanical and antibacterial properties of bioactive glass", *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, vol. 538, pp. 393-403, 2018, Impact Factor: 2.829.

Effects of Transition Metal Ion Dopants (Ag, Cu and Fe) on the Structural, Mechanical and Antibacterial Properties of Bioactive Glass

Nidhi Gupta, **Deenan Santhiya***, Sevi Murugavel, Anil Kumar, Anusha Aditya, Munia Ganguli and Shashank Gupta

Abstract: In this investigation, an attempt has been made to provide comparative insight into the structural integrity, mechanical strength and anti-bacterial properties of three different transition metal ions namely Ag, Cu and Fe doped mesoporous nanobioglass for bone tissue engineering. Comparative ^{29}Si NMR of the various bioglass samples was elucidated for structural integrity evaluation. Interestingly, in spite of conventional Si network former substitution, herein Ag, Cu and Fe substituted the network modifier atomic sites at a concentration of 2 wt%. This in turn affected the dissolution behavior of various ions present in the bioactive glass network. Henceforth, it potentiates the bioactive response as well as mechanical strength of the material. The mechanical response of the material against both sinusoidal and oscillatory stress forces has been measured. In terms of anti-bacterial properties, unlike the expected higher response of silver loaded bioglass, herein, interestingly copper followed by iron loaded bioactive glass displayed an excellent activity. It could be corroborated based on the structural parameters namely, network connectivity and dopant phase. The scarcity of literature data on the cytotoxicity of doped bioglass samples motivated us to evaluate the same. In brief, correlation between textural, structural, mechanical, bioactivity and cytotoxicity for the various dopants doped bioglass has been first time brought out together for the efficient bone regeneration application. Along with this, magnetic behavior of iron doped bioglass sample has also been evaluated.

For details refer to <https://doi.org/10.1016/j.colsurfa.2017.11.023>

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Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **M. Jain** and S.K. Gupta, "Desulfurization of FCC gasoline by using spiral wound pervaporation module: Removal of different types of sulfur containing species", *Chemical Engineering Research and Design*, vol. 136, pp. 105-118, 2018, Impact Factor: 2.795.

Desulfurization of FCC Gasoline by using Spiral Wound Pervaporation Module: Removal of Different Types of Sulfur Containing Species

Manish Jain and Sharad Kumar Gupta

Abstract: In last decade, pervaporation has been recognized as a promising novel process for desulfurization of FCC (Fluidized Catalytic Cracking) gasoline. This study deals with the comparison of the removal of different types of sulfur containing species by a spiral wound pervaporation module. For this, different binary systems containing 2-methyl thiophene, 1-butanethiol and diethyl sulfide as solute and *n*-heptane as solvent are selected as model gasoline. Results reported in our previous study on *n*-heptane/thiophene systems are also included in the analysis. Experiments were performed on a spiral wound module with PDMS/PI (Polydimethylsiloxane/Polyimide) composite membrane at a variety of operating conditions. A suitable mathematical model was then used to predict the module performance theoretically. Some of the experimental results were used to predict the membrane transport parameters for different sulfur containing compounds, and the remaining experimental results were then used to validate the mathematical model. Comparison of the model predictions and experimental results validated the mathematical model, which suggests that the reported mathematical model can be applied to design the spiral wound pervaporative modules to remove higher molecular weight thiophenes as well as other sulfur containing compounds.

The presented results show that the PDMS/PI membrane is selective for all three sulfur containing compounds. However, the pervaporation process is found more suitable for removal of lower molecular weight thiophenes. Results further show that the optimum operating conditions for sulfur removal may depend on the functional groups present and molecular weight of sulfur containing compounds present in the gasoline.

For details refer to <https://doi.org/10.1016/j.cherd.2018.05.007>



BIOGRAPHY

DR. RAM SINGH

Department of Applied Chemistry

Dr. Ram Singh belongs to a village Chandauli of the Sitamarhi district, Bihar, India. He did his schooling from Sainik School Tilaiya. He received his B.Sc., M.Sc. and Ph.D. from University of Delhi. He worked at CEMDE and Department of Chemistry, University of Delhi, before joining Delhi Technological University in July 2010. At present, he is Associate Professor in the Department of Applied Chemistry, DTU. He is working in the field of medicinal and natural product chemistry. He has published over 65 research papers in refereed journals, authored 8 books, 14 book chapters, 31 modules for ePG Pathshala and contributed in 80 conferences. He has supervised 3 Ph.D. and 10 M.Tech. students. He has filed two patents from his work. His research has been funded by DST, CSIR, and DRDO. He is on Editorial Advisory Board of various journals of repute and Life Member of various societies.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **R. Singh** and B. Veer, "Hydrogels: Promising energy storage materials", *ChemistrySelect*, vol. 3, pp. 1309-1320, 2018, Impact Factor: 1.505.
2. **R. Singh**, S. Shahi and Geetanjali, "Chemical degradation of poly(bisphenol A carbonate) waste materials: A review", *ChemistrySelect*, vol. 3, pp. 11957– 11962, 2018, Impact Factor: 1.505.

Hydrogels: Promising Energy Storage Materials

Ram Singh and Babita Veer

Abstract: Energy is essential for the economic growth of any country. There is a strong demand for the development of materials that can show potential towards higher power density and energy density. In this article, a promising class of polymeric materials, hydrogels have been discussed as an energy storage material. The hydrogels are advantageous as they possess in them the unique combination of organic conductors and conventional polymers. The article covers the synthetic approach of hydrogels which includes both the conventional synthesis and the new routes adopted followed by the application of hydrogels as energy storage materials. Finally, the future opportunities and prospects in the development of hydrogels as advanced energy storage materials are highlighted.

For details refer to <https://doi.org/10.1002/slct.201702515>

Chemical Degradation of Poly (Bisphenol A Carbonate) Waste Materials: A Review

Ram Singh, Surybala Shahi and Geetanjali

Abstract: Plastics are indispensable and integral part of our daily life. Each year, we generate tonnes of plastics waste. Poly (bisphenol A carbonate) has created a space for itself in the plastic industry due to its high-performance properties. The high rate of production created a major challenge in its management after use or becoming as waste. In this brief review, we have described the chemical degradation of poly(bisphenol A carbonate) and the use of catalyst and reagents. Some of the most utilized chemical degradation methods like alcoholysis, hydrolysis and aminolysis have been explained in detail. The chemical reactions involved in the degradation process have also been discussed.

For details refer to <https://doi.org/10.1002/slct.201802577>



BIOGRAPHY

DR. RAMINDER KAUR

Department of Applied Chemistry

Dr. Raminder Kaur is Assistant Professor in the Department of Polymer Science and Chemical Technology (Applied Chemistry Department), Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. She received her doctorate degree in Chemical Engineering from Indian Institute of Technology, Delhi (IITD). She has received her M.Tech. degree in Polymer Technology from Department of Chemical Engineering, Panjab University, Chandigarh, Punjab and her B.Tech. degree in Chemical Engineering from Beant College of Engineering and Technology, Gurdaspur, Punjab. Her research interests include Reaction Engineering, Bio-based Polymeric Materials and Composites, Pollution Abatement Technologies. She has published over 25 research papers in international journals, one book chapter and about 30 papers in national and international conferences. She is working on a research project funded by Directorate of ER & IPR, Ministry of Defence, India. She is a fellow of IEChE, The Society of Polymer Science, India and Asian Polymer Association.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. M. Malik and **R. Kaur**, "Mechanical and thermal properties of castor oil-based polyurethane adhesive: Effect of TiO₂ filler", *Advances in Polymer Technology*, vol. 37, no. 1, pp. 24-30, 2018, Impact Factor: 2.073.
2. M. Malik and **R. Kaur**, "Influence of aliphatic and aromatic isocyanates on the properties of poly (ether ester) polyol based PU adhesive system", *Polymer Engineering & Science*, vol. 58, no. 1, pp. 112-117, 2018, Impact Factor: 1.551.
3. M. Malik and **R. Kaur**, "Synthesis of NIPU by the carbonation of canola oil using highly efficient 5, 10, 15-tris (pentafluorophenyl) corrolato-manganese (III) complex as novel catalyst", *Polymers for Advanced Technologies*, vol. 29, no. 3, pp. 1078-1085, 2018, Impact Factor: 2.137.

Mechanical and Thermal Properties of Castor Oil-Based Polyurethane Adhesive: Effect of TiO₂ Filler

Manjeet Malik and *Raminder Kaur**

Abstract: Polyurethane (PU) production with the use of vegetable oils is greatly appreciated by researchers due to their low cost, easy availability, and nontoxic nature. The addition of TiO₂ in castor oil-based PU adhesive led to a remarkable enhancement in its mechanical and chemical resistance, an increase in T_g value, and the adhesion. TGA analysis was done to study the thermal stability of prepared adhesive. The adhesive was also characterized by differential scanning calorimetry (DSC) and FT-IR spectroscopy. Influence of various factors such as the NCO/OH molar ratio, hydroxyl value of polyols, and the amount of filler on the properties of adhesive were studied in detail. The adhesive with a mole ratio of NCO/OH equaling to 1.2, filled with 3 wt% TiO₂, was found to be much better than the commercial adhesive used for bonding wood, when tested for single lap shear strength in various environmental conditions.

For details refer to <https://doi.org/10.1002/adv.21637>

Influence of Aliphatic and Aromatic Isocyanates on the Properties of Poly (Ether Ester) Polyol Based PU Adhesive System

Manjeet Malik and *Raminder Kaur**

Abstract: This study has been conducted with an emphasis to develop a biobased polyol from canola oil by transesterification reaction followed by epoxidation and ring opening reaction with an intention to insert hydroxyl group at unsaturation sites. The products obtained were characterized by nuclear magnetic resonance and FTIR spectroscopy for structural analysis and to determine the extent of reaction. Further, the studies have been conducted on different Polyurethane (PU) adhesives obtained by reacting this resulted canola oil based polyether-ester polyol and various kinds of aliphatic or aromatic diisocyanates commercially available, i.e., Methylenediphenyldiisocyanate (MDI), Toulenediisocyanate (TDI), Isophoronediiisocyanate (IPDI), Hexamethylenediisocyanate (HMDI) with a purpose to examine their influence on adhesive properties such as green strength, curing time, gel time, lap shear strength. The properties of resulted polyurethanes had shown considerable (or prominent) variation in their behavior particularly in terms of thermal stability, adhesion strength, corrosion resistance, etc. The synthesized adhesive showed much better performance as compared to commercially available adhesive formulation under different conditions of testing. The thermal stability of PU adhesive formulation were analyzed and compared by thermogravimetric analysis.

For details refer to <https://doi.org/10.1002/pen.24537>

**Corresponding Author*

Synthesis of NIPU by the Carbonation of Canola Oil using Highly Efficient 5, 10, 15-tris (Pentafluorophenyl) Corrolato-Manganese (III) Complex as Novel Catalyst

Manjeet Malik and **Raminder Kaur***

Abstract: For the green synthesis of polyurethane (PU), non-isocyanate routes are worthy alternatives. In the present work, we have explored 5,10,15-tris(pentafluorophenyl)corrolato-manganese(III) complex as novel catalyst for coupling reaction between epoxidized canola oil and CO₂ (gaseous) to introduce cyclic carbonate moieties in the oil and further used it to obtain non-isocyanate PU, generally abbreviated as NIPU, by curing with different diamines. The results obtained indicated a 1/4th of the reduction in reaction time with the use of 5,10,15-tris(pentafluorophenyl)corrolato-manganese(III) complex as catalyst as compared to the previously reported literature data. As per the reported studies, the corrole metal complex has not been used for this reaction earlier. The structure of products and intermediates were confirmed by using different characterization techniques like ¹H NMR and FTIR spectroscopies. The thermal and mechanical behavior of final product was analyzed by TGA and universal testing machine, respectively. The non-isocyanate PU obtained showed a good thermal stability up to 200°C and a tensile strength of up to 8 MPa. The effect of structure of diamines on the properties of non-isocyanate PU was also extensively studied.

For details refer to <https://doi.org/10.1002/pat.4219>

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BIOGRAPHY

DR. ROLI PURWAR

Department of Applied Chemistry

Dr. Roli Purwar is currently working as Associate Professor in the discipline of Polymer Science and Chemical Technology, Department of Applied Chemistry, DTU. In addition to academics she is holding position of Assistant Director of International affairs and co-coordinator, IPR cell at DTU. She has joined DTU as Assistant Professor in the year 2010. Dr. Purwar has been awarded “Young scientist fast Track Project” as Principal Investigator by SERB-DST, Govt. of India during 2012-2015. She has developed two technologies namely “Acrylic based formulations for floor” and “Formulation for improving the impact properties of recycled polypropylene” and transferred to industries. Three patents (2 Indian and 1 US) are in her credit. Recently she has been received grant of Rs.26 lakh under EMR-SERB project as Principal Investigator by DST, Govt. of India for three years 2018-2021. She has published more than 60 papers in journal of international repute and in proceeding of national/ international conference. She has supervised 1 Ph.D. and 9 M.Tech. thesis.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. C.M. Srivastava and **R. Purwar**, “Fabrication of 3D Self-Assembled Nonmulberry *Antheraea Mylitta* (tasar) Fibroin Nonwoven Mats for Wound Dressing Applications”, *Macromolecular Research*, vol. 26, no. 10, pp. 872-881, 2018, Impact Factor: 1.767.

Fabrication of 3D Self-Assembled Nonmulberry *Antheraea Mylitta* (Tasar) Fibroin Nonwoven Mats for Wound Dressing Applications

Chandra Mohan Srivastava and **Roli Purwar***

Abstract: This research was focused on the two-step regeneration of *Antheraea mylitta* (tasar) fibroin in the form of electrospun 3D self-assembled nanofibrous nonwoven mats using ionic liquid and formic acid/CaCl₂. The self-assembled structure of tasar nanofibrous nonwoven mats was dependent on the silk fibroin concentration and spinning voltage. The secondary conformation of tasar fibroin protein before and after electrospinning was analyzed by Fourier transformation infrared spectroscopy. The morphology of the nanofibrous mat was studied by scanning electron microscope. The self-assembled 3D tasar nonwoven nanofibrous construct was a highly porous and spongy structure with high water absorption and water vapor transmission. Highly porous 3D self-assembled tasar nonwoven nanofibrous construct favored good growth and proliferation of L929 skin fibroblast cells. Based on these properties, 3D self-assembled tasar nonwoven nanofibrous construct is a promising material for skin tissue engineering and wound dressing applications.

For details refer to: <https://doi.org/10.1007/s13233-018-6121-1>

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BIOGRAPHY

DR. SAURABH MEHTA *Department of Applied Chemistry*

Dr. Saurabh Mehta obtained his Ph.D. in Organic Chemistry from Iowa State University, Ames, Iowa, USA (2009). He previously obtained his M.Phil. (Industrial Methods of Chemical Analysis) from IIT Roorkee (2001). He has also worked in the pharmaceutical industry for approximately 3 years. Dr. Mehta has been working as an Assistant Professor in the Department of Applied Chemistry, Delhi Technological University, since July 2010. He was a visiting researcher (2014-15) at the Miller School of Medicine, University of Miami, FL, USA. Dr. Mehta's research interests include Synthetic Organic Chemistry, (especially the development of new methodologies for the synthesis of medicinally important heterocyclic compounds), Combinatorial Chemistry, Cheminformatics and Chemical Biology. He is also interested in antibacterial and anticancer Drug Discovery.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. D. Brahmchari, A.K. Verma and **S. Mehta**, "Regio- and Stereoselective Synthesis of Isoindolin-1-ones through BuLi-mediated Iodoaminocyclization of 2-(1-Alkynyl) benzamides", *The Journal of Organic Chemistry*, vol. 83, pp. 3339-3347, 2018, Impact Factor: 4.805.

Regio- and Stereoselective Synthesis of Isoindolin-1-Ones through BuLi-Mediated Iodoaminocyclization of 2-(1-Alkynyl)benzamides

Dhirendra Brahmchari, Akhilesh K. Verma and **Saurabh Mehta***

Abstract: A simple and straightforward synthesis of isoindolin-1-ones is reported. Exclusive *N*-cyclization of the amide functional group, an ambident nucleophile, was accomplished for the cyclization of 2-(1-alkynyl)benzamides using *n*-BuLi-I₂/ICl. The methodology works with the primary amide and affords the desired isoindolinones in yields of 38–94%. Interestingly, the isolated products exhibit a *Z*-stereochemistry across the C=C double bond. The reaction mechanism involving the formation of either a vinylic anion or an intimate ion pair intermediate is proposed.

For details refer to: <https://pubs.acs.org/doi/abs/10.1021/acs.joc.7b02903>

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BIOGRAPHY

PROF. ANJANA GUPTA

Department of Applied Mathematics

Prof. Anjana Gupta is currently working in the Department of Applied Mathematics, Delhi Technological University since October 2016. She is the coordinator of B.Tech Mathematics & Computing course in the Department of Applied Mathematics since 2013 and has been member and chairperson of various committees in the Department as well as in the University. Her qualifications are B.Sc. (Hons.) Mathematics, M.Sc. (Hons.) Mathematics, M.Phil. & Ph.D. from Delhi University. She has achieved the Chartered Management Institute (CMI) Level 5 Certificate in Management and Leadership under UKIERI India Scheme collaborated by AICTE. Professor Anjana Gupta has published numerous research papers in the journals of international repute and proceedings of various international conferences. Professor Anjana Gupta is life time member of Indian Science Congress Association. Her specialization includes mathematical programming, optimization techniques, fuzzy logics and optimization, computing with words, supply chain management, multicriteria decision making, image processing and machine learning.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. M. Sahu, **A. Gupta** and A. Mehra, "Acceptably consistent incomplete interval-valued intuitionistic multiplicative preference relations", *Soft Computing*, vol. 22, no. 22, pp. 7463–7477, 2018, Impact Factor: 2.367.

Acceptably Consistent Incomplete Interval-Valued Intuitionistic Multiplicative Preference Relations

Mamata Sahu, **Anjana Gupta*** and Aparna Mehra

Abstract: We study the consistency property, and especially the acceptably consistent property, for incomplete interval-valued intuitionistic multiplicative preference relations. We propose a technique which first estimates the initial values for all missing entries in an incomplete interval-valued intuitionistic multiplicative preference relation and then improves them by a local optimization method. Two examples are presented in order to illustrate applications of the proposed method in group decision-making problems.

For details refer to <https://doi.org/10.1007/s00500-018-3358-8>

*Corresponding Author



BIOGRAPHY

DR. CHANDRA PRAKASH SINGH

Department of Applied Mathematics

Dr. Chandra Prakash Singh is an Associate Professor at Department of Applied Mathematics, Delhi Technological University, Delhi. He received his Ph.D. degree in Applied Mathematics in 2000 from Indian Institute of Technology, Banaras Hindu University, Varanasi. His area of research is gravitation and cosmology. He has published 75 research papers in refereed international (60) and national (15) journals of repute. He has attended and presented 20 research papers in national and international conferences. He has also delivered many invited talk lectures in the conference. Four Ph.D. students have already received his Ph.D. degree and 2 Ph.D. students are working under his supervision. He has a rich experience of teaching of 20 years in the subject of “Pure and Applied Mathematics”. He has been involved in many responsible administrative works in the Department and University. He was the warden of boys hostel from 2009 – 2014.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. **C.P. Singh** and M. Srivastava, “Viscous cosmology in new holographic dark energy model and the cosmic acceleration”, *European Physical Journal C*, vol. 78, no. 3, pp. 190, 2018, Impact Factor: 5.172.
2. **C.P. Singh** and A. Kumar, “Ricci dark energy model with bulk viscosity”, *European Physical Journal Plus*, vol. 133, pp. 312, 2018, Impact Factor: 2.240.
3. M. Srivastava and **C.P. Singh**, “New holographic dark energy model with constant bulk viscosity in modified $f(R,T)$ gravity theory”, *Astrophysics and Space Science*, vol. 363, no. 6, pp.117, 2018, Impact Factor: 1.885.

Viscous Cosmology in New Holographic Dark Energy Model and the Cosmic Acceleration

Chandra Prakash Singh and Milan Srivastava

Abstract: In this work, we study a flat Friedmann–Robertson–Walker universe filled with dark matter and viscous new holographic dark energy. We present four possible solutions of the model depending on the choice of the viscous term. We obtain the evolution of the cosmological quantities such as scale factor, deceleration parameter and transition redshift to observe the effect of viscosity in the evolution. We also emphasis upon the two independent geometrical diagnostics for our model, namely the statefinder and the Om diagnostics. In the first case we study new holographic dark energy model without viscous and obtain power-law expansion of the universe which gives constant deceleration parameter and statefinder parameters. In the limit of the parameter, the model approaches to Λ CDM model. In new holographic dark energy model with viscous, the bulk viscous coefficient is assumed as $\zeta = \zeta_0 + \zeta_1 H$, where ζ_0 and ζ_1 are constants, and H is the Hubble parameter. In this model, we obtain all possible solutions with viscous term and analyze the expansion history of the universe. We draw the evolution graphs of the scale factor and deceleration parameter. It is observed that the universe transits from deceleration to acceleration for small values of ζ in late time. However, it accelerates very fast from the beginning for large values of ζ . By illustrating the evolutionary trajectories in r - s and r - q planes, we find that our model behaves as an quintessence like for small values of viscous coefficient and a Chaplygin gas like for large values of bulk viscous coefficient at early stage. However, model has close resemblance to that of the Λ CDM cosmology in late time. The Om has positive and negative curvatures for phantom and quintessence models, respectively depending on ζ . Our study shows that the bulk viscosity plays very important role in the expansion history of the universe.

For details refer to <https://doi.org/10.1140/epjc/s10052-018-5683-6>

Ricci Dark Energy Model with Bulk Viscosity

Chandra Prakash Singh and Ajay Kumar

Abstract: In order to explore the possibility of bulk viscosity as a possible candidate of dark energy to explain the accelerating universe, we investigate the dissipative processes in the holographic Ricci dark energy (HRDE) model within the framework of the standard Eckart theory of relativistic thermodynamics. We assume that the flat Friedmann-Robertson-Walker universe is filled with pressureless dark matter and viscous HRDE. We obtain the exact solutions of non-viscous and viscous HRDE models, respectively. We plot the evolution of the scale factor and deceleration parameter to observe the transition phase in the viscous case. We also discuss two geometrical diagnostics, namely the statefinder and Ω_m to discriminate from other existing dark energy models. In the non-viscous HRDE model, the power-law form of expansion is obtained which gives the constant deceleration parameter and statefinder pair. It does not show phase transition. In the viscous HRDE model, we consider all possible forms of bulk viscous coefficient (with constant or general form of viscous terms) and discuss the cosmological evolution in detail. We obtain the exponential expansion of the scale factor which gives the time-dependent deceleration parameter and statefinder pair. The model shows the transition from the decelerated phase to the accelerated phase depending on the values of the viscous term. It starts to accelerate in the past for large values of the viscous term. The trajectory of the statefinder pair shows that for small values of the viscous term, the trajectory is curved and starts from quintessence in early time and approaches to Λ CDM model in late time. It is also observed that for large values of the viscous term, it behaves like the Chaplygin gas in early time but approaches to Λ CDM model in late time. We also plot the trajectory of the deceleration parameter, statefinder pair and Ω_m with the model parameter to observe the evolutionary behavior of the universe. It also shows a similar behavior except for the fact that it only behaves as quintessence in the past but approaches to Λ CDM or the steady state model in late time. The results of viscous HRDE models show that the recent acceleration is well explained with the viscous term.

For details refer to <https://doi.org/10.1140/epjp/i2018-12122-y>

New Holographic Dark Energy Model with Constant Bulk Viscosity in Modified $f(R,T)$ Gravity Theory

Milan Srivastava and Chandra Prakash Singh*

Abstract: The aim of this paper is to study new holographic dark energy (HDE) model in modified $f(R,T)$ gravity theory within the framework of a flat Friedmann-Robertson-Walker model with bulk viscous matter content. It is thought that the negative pressure caused by the bulk viscosity can play the role of dark energy component, and drive the accelerating expansion of the universe. This is the motive of this paper to observe such phenomena with bulk viscosity. In the specific model $f(R,T)=R+\lambda T$, where R is the Ricci scalar, T the trace of the energy-momentum tensor and λ is a constant, we find the solution for non-viscous and viscous new HDE models. We analyze new HDE model with constant bulk viscosity, $\zeta = \zeta_0 = \text{const.}$ to explain the present accelerated expansion of the universe. We classify all possible scenarios (deceleration, acceleration and their transition) with possible positive and negative ranges of λ over the constraint on ζ_0 to analyze the evolution of the universe. We obtain the solutions of scale factor and deceleration parameter, and discuss the evolution of the universe. We observe the future finite-time singularities of type I and III at a finite time under certain constraints on λ . We also investigate the statefinder and Om diagnostics of the viscous new HDE model to discriminate with other existing dark energy models. In late time the viscous new HDE model approaches to Λ CDM model. We also discuss the thermodynamics and entropy of the model and find that it satisfies the second law of thermodynamics.

For details refer to <https://doi.org/10.1007/s10509-018-3340-z>

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BIOGRAPHY

PROF. NAOKANT DEO

Department of Applied Mathematics

Prof. Naokant Deo is working in Department of Applied Mathematics, Delhi Technological University since 2000. He did his B.Sc., M.Sc. and Ph.D. from G.G. Central University, Bilaspur, Chattisgarh. His Ph.D. is in Approximation Theory. He joined Delhi College of Engineering through UPSC. He received Postdoctoral Fellowship in 2005 and completed it from International Centre for Theoretical Physics, Trieste, Italy. He has published 46 papers in international journals, 3 in national journals and 2 book chapters. He is a reviewer of many journals like American Mathematical Society (AMS), Zentralblatt MATH and Computing Letter (CoLe).

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. M Dhamija, R. Pratap and **N. Deo**, "Approximation by Kantorovich form of modified Szasz-Mirakyan operators", *Applied Mathematics and Computation*, vol. 317, pp. 109-120, 2018, Impact Factor: 2.300.

**Corresponding Author*

Approximation by Kantorovich Form of Modified Szász–Mirakyan Operators

*Minakshi Dhamija, Ram Pratap and Naokant Deo**

Abstract: In the present article, we consider the Kantorovich type generalized Szász–Mirakyan operators based on Jain and Pethe operators [32]. We study local approximation results in terms of classical modulus of continuity as well as Ditzian–Totik moduli of smoothness. Further we establish the rate of convergence in class of absolutely continuous functions having a derivative coinciding a.e. with a function of bounded variation.

For details refer to <https://doi.org/10.1016/j.amc.2017.09.004>



BIOGRAPHY

PROF. R. SRIVASTAVA

Department of Applied Mathematics

Prof. R. Srivastava is working in Department of Applied Mathematics, Delhi Technological University. He obtained the M.Sc. degree in Mathematics with Gold Medal, and Ph.D. degree in Mathematics from Gorakhpur University, UP. He has a teaching experience of 28 years. His current area of interest is Financial Mathematics.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. G. Malhotra, **R. Srivastava** and H.C. Taneja, "Quadratic approximation of the slow factor of volatility in a multifactor stochastic volatility model", *Journal of Futures Markets*, vol. 38, no. 5, pp.607-624, 2018, Impact Factor: 1.291.

Quadratic Approximation of the Slow Factor of Volatility in A Multifactor Stochastic Volatility Model

*Gifty Malhotra, **R. Srivastava*** and H.C. Taneja*

Abstract: A new multifactor stochastic volatility model is proposed in which the slow volatility factor is approximated by a quadratic arc. The perturbation technique is used to obtain the approximate expression for the European option price. The notion of a modified Black-Scholes price is introduced. A simplified expression for the European option price, perturbed around the modified Black-Scholes price, is obtained. An expression of modified price is also obtained in terms of the Black-Scholes price. The effect of this modification on pricing is explained, the accuracy of the approximate option pricing formula established, and its computational cost discussed.

For details refer to <https://doi.org/10.1002/fut.21895>

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BIOGRAPHY

MS. RITU GOEL

Department of Applied Mathematics

Ms. Ritu Goel is a research scholar in the Department of Applied Mathematics, Delhi Technological University. Her broad area of research is Information Theory.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **R. Goel**, H. C. Taneja and V. Kumar, "Measure of entropy for past lifetime and k -record statistics", *Physica A: Statistical Mechanics and its Applications*, vol. 503, pp. 623-631, 2018, Impact Factor: 2.132.

Measure of Entropy for Past Lifetime and K -Record Statistics

Ritu Goel, H. C. Taneja and Vikas Kumar

Abstract: In this paper we consider a measure of past entropy for n th upper -record value. A characterization result for the measure under consideration is given. We discuss some basic properties of the proposed measure. Also we construct bounds to the proposed past entropy measure for n th -records.

For details refer to <https://doi.org/10.1016/j.physa.2018.02.200>



BIOGRAPHY

DR. SATYABRATA ADHIKARI *Department of Applied Mathematics*

Dr. Satyabrata Adhikari is working as Assistant Professor (under UGC-Faculty Recharge Programme) in the Department of Applied Mathematics, Delhi Technological University. His research interest is in quantum information theory. He obtained his Ph.D. degree from Bengal Engineering and Science University, Shibpur (now it is renamed as IEST). After Ph.D., he availed post doctoral fellowship from S. N. Bose National Centre for Basic Sciences, Kolkata, India; Korean Advanced Institute of Science and Technology, South Korea and Institute of Physics, Bhubaneswar, India.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **S. Adhikari**, "Structural physical approximation for the realization of the optimal singlet fraction with two measurements", *Physical Review A*, vol. 97, pp. 042344, 2018, Impact Factor: 2.909.

Structural Physical Approximation for the Realization of the Optimal Singlet Fraction with Two Measurements

Satyabrata Adhikari

Abstract: Structural physical approximation (SPA) has been exploited to approximate nonphysical operation such as partial transpose. It has already been studied in the context of detection of entanglement and found that if the minimum eigenvalue of SPA to partial transpose is less than 29 then the two-qubit state is entangled. We find application of SPA to partial transpose in the estimation of the optimal singlet fraction. We show that the optimal singlet fraction can be expressed in terms of the minimum eigenvalue of SPA to partial transpose. We also show that the optimal singlet fraction can be realized using Hong-Ou-Mandel interferometry with only two detectors. Further we have shown that the generated hybrid entangled state between a qubit and a binary coherent state can be used as a resource state in quantum teleportation.

For details refer to: <https://doi.org/10.1103/PhysRevA.97.042344>



BIOGRAPHY

DR. AJEET KUMAR

Department of Applied Physics

Dr. Ajeet Kumar received the B.Sc. degree from Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, India, in 2002, the M.Sc. degree from the Indian Institute of Technology Roorkee, Roorkee, India, in 2004, and the Ph.D. degree from the Indian Institute of Technology Roorkee, Roorkee, India, in 2009. He was a Postdoctoral Fellow in the Gwangju Institute of Science and Technology (GIST), Korea. In July 2010, he joined the Delhi Technological University, Delhi, where he is currently an Assistant Professor. He has published more than 120 research articles in journal and conferences. His current research interests include novel large mode area single-mode fibers, segmented cladding fibers, fiber optic sensors, nonlinear fiber, and waveguide long period gratings. Dr. Kumar is recipient of Young Scientist Award by Uttarakhand Government, India. He is a Life member of Optical Society of India (OSI), Indian Laser association (ILA) and The Indian Science Congress Association (ISCA) and member of Optical Society of America (OSA).

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. P. Chauhan, **A. Kumar** and Y. Kalra, “Mid-infrared broadband supercontinuum generation in a highly nonlinear rectangular core chalcogenide photonic crystal fiber”, *Optical Fiber Technology*, vol. 46, pp. 174–178, 2018, Impact Factor: 1.350.
2. P. Siwach, **A. Kumar** and T. S. Saini, “Broadband supercontinuum generation spanning 1.5–13 μm in $\text{Ge}_{11.5}\text{As}_{24}\text{Se}_{64.5}$ based chalcogenide glass step index optical fiber”, *Optik*, vol. 156, pp. 564–570, 2018, Impact Factor: 1.191.

Mid-infrared Broadband Supercontinuum Generation in a Highly Nonlinear Rectangular Core Chalcogenide Photonic Crystal Fiber

Pooja Chauhan, **Ajeet Kumar*** and Yogita Kalra

Abstract: We report the numerical modeling of a highly nonlinear rectangular core Ga-Sb-S chalcogenide photonic crystal fiber for supercontinuum generation in the mid-infrared region. Numerical investigation of linear and nonlinear optical processes has been performed. A finite element method has been employed to study the optical characteristics of confined fundamental mode. Optimization of geometrical parameters i.e., pitch, the diameter of bigger and smaller air-holes has been done in order to achieve small and normal dispersion at the pump wavelength. The proposed design is capable of generating supercontinuum spanning 1–14 μm using a 9 mm long fiber pumped with 90 fs secant hyperbolic pulse of the peak power of 8.19 kW. Such photonic crystal fiber structure in Ga-Sb-S chalcogenide glass is reported the first time and can be proven effective for nonlinear applications of photonic devices.

For details refer to <https://doi.org/10.1016/j.yofte.2018.10.004>

Broadband Supercontinuum Generation Spanning 1.5–13 μm in $\text{Ge}_{11.5}\text{As}_{24}\text{Se}_{64.5}$ Based Chalcogenide Glass Step Index Optical Fiber

Priti Siwach, **Ajeet Kumar*** and Than Singh Saini

Abstract: We have reported a design of a step index optical fiber in $\text{Ge}_{11.5}\text{As}_{24}\text{Se}_{64.5}$ chalcogenide glass. The proposed design of optical fiber is analyzed using full vectorial finite element method. The structure offers a high nonlinear coefficient of $1431 \text{ W}^{-1} \text{ km}^{-1}$. Due to this high nonlinearity of the optical fiber a supercontinuum spectrum ranging from 1.5–13 μm generated in only 10 mm long fiber by applying 50 fs laser secant pulses of 4000 W peak power at the pump wavelength of 3.1 μm . The use of femtosecond pulse laser results in the supercontinuum with high shot-to-shot coherence. Broadband mid-infrared supercontinuum generation has many applications such as in medical diagnosis, food quality control, gas sensing, telecommunication, and optical metrology etc.

For detail refer to <https://doi.org/10.1016/j.ijleo.2017.11.199>

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BIOGRAPHY

DR. AMRISH K. PANWAR

Department of Applied Physics

Dr. Amrish K. Panwar is presently Assistant Professor in Department of Applied Physics, Delhi Technological University, Delhi since August 2010. He has worked as senior lecturer in department of physics, JUET, Guna (M.P.) during 2008 to 2010. He did M.Sc. in Solid State Physics from CCS University, Meerut (U.P.). He received Ph.D. degree in Condensed Matter Physics from Department of Physics, Indian Institute of Technology Roorkee, India in 2005. After completing Ph.D. degree, he joined department of Metallurgical & Materials Engineering, IIT Kharagpur, W.B. as Postdoctoral Research Associate from 2006 to 2008. Besides of teaching assignment in condensed matter physics, he is actively involved in research and development work. Dr. Panwar has been awarded 'Young Scientist fast track project' as principal investigator by SERB-DST, Govt. of India during 2012-2017. He has supervised 2 Ph.D., 21 M.Tech and more than 53 B.Tech students. He has published about 65 research papers in journal of international repute and in proceedings of national/ international conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. A. Jain, **A. K. Panwar** and A. K. Jha, "Significant improvement in morphological, dielectric, ferroelectric and piezoelectric characteristics of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Ti}_{0.9}\text{Zr}_{0.1}\text{O}_3\text{-BaNb}_2\text{O}_6$ nanocomposites", *Journal of Materials Science: Materials in Electronics*, vol. 29, no. 22, pp. 19086-19098, 2018, Impact Factor: 2.993.
2. A. Jain, **A. K. Panwar** and A. K. Jha, "Significant enhancement in structural, dielectric, piezoelectric and ferromagnetic properties of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3\text{-CoFe}_2\text{O}_4$ multiferroic composites", *Materials Research Bulletin*, vol. 100, pp-367-376, 2018, Impact Factor: 2.873.
3. R. Saroha, **A. K. Panwar**, A. Gaur, V. Kumar, Y. Sharma and P. K. Tyagi, "Electrochemical studies of novel olivine-layered ($\text{LiFePO}_4\text{-Li}_2\text{MnO}_3$) dual composite as an alternative cathode material for Lithium-ion batteries", *Journal of Solid State Electrochemistry*, vol. 22, no.8, pp-2507-2513, 2018, Impact Factor: 2.509.

Significant Improvement in Morphological, Dielectric, Ferroelectric and Piezoelectric Characteristics of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Ti}_{0.9}\text{Zr}_{0.1}\text{O}_3$ - BaNb_2O_6 Nanocomposites

Aditya Jain, **Amrish K. Panwar*** and A.K. Jha

Abstract: Multifunctional composite with material composition $(1 - x)\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Ti}_{0.9}\text{Zr}_{0.1}\text{O}_3 - x\text{BaNb}_2\text{O}_6$ ($x=0.0, 0.05, 0.1, 0.2$ and 0.3) has been successfully synthesized using mechano-chemical activation process. The co-existence of perovskite tetragonal phase of BSTZ and niobate orthorhombic phase of BNO was detected by X-ray diffraction measurement and confirmed by Rietveld analysis. All the BSTZ–BNO composites show a polygonal grain type morphology with clearly visible grain boundaries. BSTZ–BNO composites possessed a thermally stable dielectric constant within a broad range of temperature. The obtained results show a strong influence of BNO addition on the microstructural, dielectric, ferroelectric, piezoelectric and breakdown strength of bare BSTZ ceramic. For $x=0.10$, the composite exhibit optimum properties with high dielectric constant $\epsilon_m = 5842$, large remnant polarization $P_r = 9.25 \mu\text{C}/\text{cm}^2$, improved piezoelectric constant $d_{33} = 296 \text{ pC}/\text{N}$ and high breakdown strength $E_{bd} = 304 \text{ kV}/\text{cm}$. The high dielectric constant accompanied by very low dielectric loss and large piezoelectric constant make BSTZ–BNO a suitable material for ceramic capacitors and electromechanical device applications.

For detail refer to <https://doi.org/10.1007/s10854-018-0035-8>

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Significant Enhancement in Structural, Dielectric, Piezoelectric and Ferromagnetic Properties of $\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3\text{-CoFe}_2\text{O}_4$ Multiferroic Composite

Aditya Jain, **Amrish K. Panwar*** and A.K. Jha

Abstract: Multiferroic composites $(1-x)\text{Ba}_{0.9}\text{Sr}_{0.1}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3\text{-(}x\text{)CoFe}_2\text{O}_4$ ($x = 0.0, 0.05, 0.10, 0.20$ & 0.30) were prepared using mechanochemical activation method. Rietveld refined XRD patterns confirm the diphasic nature of composite samples. All of the diffraction peaks of $(1-x)\text{BSZT-(}x\text{)CFO}$ can be identified for the separate perovskite (BSZT) and inverse spinel (CFO) phases and no other impurity phase were observed for the composites. $(1-x)\text{BSZT-(}x\text{)CFO}$ sample with $x = 0.05$ have shown significant improvement in microstructural, dielectric, ferroelectric and piezoelectric properties over the pristine BSZT sample. Such an improvement in electrical properties can be attributed to larger grain size, improved density and easier ferroelectric domain wall motion inside the grain. Dielectric breakdown strength of the composites also shows a similar trend and is observed to be maximum for the sample with $x = 0.05$ CFO concentration. The composite samples also show a substantial enhancement in ferromagnetic characteristics and increases progressively with increase in ferrite (CFO) content.

For detail refer to <https://doi.org/10.1016/j.materresbull.2017.12.054>

Electrochemical Studies of Novel Olivine-Layered ($\text{LiFePO}_4\text{-Li}_2\text{MnO}_3$) Dual Composite as an Alternative Cathode Material for Lithium-Ion Batteries

Rakesh Saroha, **Amrish K. Panwar***, Anurag Gaur, Yogesh Sharma, Vinay Kumar and Pawan K. Tyagi

Abstract: In the present work, olivine-layered composites, i.e., $\text{LiFePO}_4\text{-Li}_2\text{MnO}_3$, are successfully synthesized in the form of a single monolithic electrode and *layer arrangement*. X-ray diffraction (XRD) patterns revealed that the prepared compositions exhibit the peaks correspond to the layered $m\text{-Li}_2\text{MnO}_3$ ($C2/m$ space group) and orthorhombic LiFePO_4 with $Pnma$ space group. Microstructural investigations indicate that all the samples possess nearly same morphology with a combination of smaller as well as bigger grains. CV results demonstrate that all the prepared samples possess anodic peak around 3.6 and 4.7 V along with a broad cathodic peak around 3.2 V which is due to intercalation of Li-ion at $16c$ octahedral sites of the spinel structure formed by MnO_2 . Among all the compositions, layer arrangement of LiFePO_4 and Li_2MnO_3 , i.e. LFP/LMO layered arrangement, shows the best cycling and rate performances. LFP/LMO exhibits a discharge capacity of 178 ± 5 mA h/g at a current density 10 mA/g and holds 98% of the capacity up to 100 charge/discharge cycles measured at 20 mA/g.

For detail refer to <https://doi.org/10.1007/s10008-018-3963-6>

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BIOGRAPHY

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Prof. A.S. Rao is working as a faculty in the Department of Applied Physics, Delhi Technological University, Delhi, India since 2012 and has a total of 25 years of teaching plus research experience. He received his Ph.D. degree from S.V. University, Tirupati, A.P. He received three Best Teacher Awards from K L University, Vijayawada, A.P, before joining DTU. He has guided 6 students for Ph.D. degree and is currently guiding 8. He has handled nearly 0.9 crores worth of projects funded by ISRO and DST and presently handling 0.9 crores worth of sponsored projects funded by DST. His research interests are photonics and atmospheric sciences. He is a lead guest editor for “American Journal of Physics and Applications”. He received an invitation from “Materials Science Research India”, Journal to act as an Editorial Board member. He has published 75 research papers in international journals and presented nearly 100 papers in national/international conferences. His h-index is 24.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. N. Deopa and **A.S. Rao**, “Spectroscopic studies of single near ultraviolet pumped Tb^{3+} doped Lithium Lead Alumino Borate glasses for green lasers and tricolour w-LEDs”, *Journal of Luminescence*, vol. 194, pp. 56-63, 2018, Impact Factor: 2.732.
2. R. Sharma and **A.S. Rao**, “Photoluminescence studies of Sm^{3+} ions doped Zinc Lead Tungsten Tellurite glasses for Reddish-Orange Photonic device applications”, *Optical Materials*, vol. 84, pp. 375-382, 2018, Impact Factor: 2.320.
3. R. Sharma and **A.S. Rao**, “Photoluminescence investigations on Dy^{3+} ions doped Zinc Lead Tungsten Tellurite glasses for Optoelectronic devices”, *Journal of Non-Crystalline Solids*, vol. 495, pp. 85-94, 2018, Impact Factor: 2.488.

Spectroscopic Studies of Single near Ultraviolet Pumped Tb³⁺ Doped Lithium Lead Alumino Borate Glasses For green Lasers and Tricolour w-LEDs

Nisha Deopa and A.S. Rao*

Abstract: Terbium ions (Tb³⁺) doped Lithium Lead Alumino Borate (LiPbAlB) glasses with the chemical composition 10Li₂O – 10PbO – (10-x) Al₂O₃ – 70B₂O₃ – xTb₂O₃ (where x = 0.5, 1.0, 1.5, 2.0 and 2.5 in mol%) were synthesized via melt quench method and characterized by absorption, photoluminescence (PL) and PL decay spectral measurements. The Judd-Ofelt (J-O) intensity parameters evaluated from the oscillator strength values are further used to evaluate the radiative parameters for the prominent fluorescent levels (⁵D₄→⁷F_j) of Tb³⁺ ions. The intensity of all the emission bands increases up to 2 mol% of Tb³⁺ and beyond concentration quenching took place. The decay profiles of ⁵D₄ show single exponential for lower concentration and non-exponential for higher concentration resulting decrease in experimental lifetime (τ_{exp}) with increase in rare earth ion concentration. Such decrease in τ_{exp} and decay conversion from single to non-exponential has been attributed to the cross-relaxation processes and subsequent concentration quenching observed. The Inokuti-Hirayama (I-H) model applied to the decay spectral profiles confirms the energy transfer process between Tb³⁺-Tb³⁺ ions as dipole-dipole in nature. Higher values of stimulated emission cross-section, quantum efficiency, gain bandwidth and optical gain obtained for ⁵D₄→⁷F₅ transition of LiPbAlB glass with 2 mol% of Tb³⁺ ions suggests its suitability for green lasers. The CIE-chromaticity co-ordinates, color purity (CP) and correlated color temperature (CCT) confirms the suitability of these glasses in tricolor w-LEDs.

For details refer to <https://doi.org/10.1016/j.jlumin.2017.09.057>

Photoluminescence Studies of Sm³⁺ Ions Doped Zinc Lead Tungsten Tellurite Glasses for Reddish-Orange Photonic Device Applications

Ritu Sharma and A.S. Rao*

Abstract: Zinc lead tungsten tellurite glasses with varying concentration of samarium ions were synthesised by melt quench method and studied their absorption, excitation, emission and decay spectral features to understand their utility in visible photonic devices. The bonding parameter evaluated from the absorption spectra reveals the nature of bonding between Sm³⁺ ions and its surrounding ligands as ionic. Judd-Ofelt intensity parameters estimated from absorption spectral features are used to evaluate radiative parameters for the fluorescent levels of Sm³⁺ ions in these glasses. The bandwidths ($\Delta\lambda_p$), emission cross-sections (σ_{se}), and branching ratios (β_R) were evaluated from the emission spectra. The experimental lifetimes measured are correlated with radiative lifetimes and were used to determine the quantum efficiency (η) of the titled glasses. Relatively higher values of σ_{se} , β_R , η and CIE coordinates obtained for 1 mol% of Sm³⁺ ions in the as prepared glass reveals its suitability for visible photonic devices.

For details refer to <https://doi.org/10.1016/j.optmat.2018.07.035>

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Photoluminescence Investigations on Dy³⁺ Ions Doped Zinc Lead Tungsten Tellurite Glasses for Optoelectronic Devices

Ritu Sharma and A.S. Rao*

Abstract: Dy³⁺ doped Zinc Lead Tungsten Tellurite (ZnPbWTe) glasses have been synthesized by conventional melt quench method and their luminescence behavior was analyzed using optical absorption, excitation, photoluminescence (PL) and PL decay spectral studies. The Judd-Ofelt (J-O) intensity parameters evaluated from the absorption spectra are used to determine various radiative parameters such as transition probability (A_R), branching ratio (β_R) and radiative lifetimes (τ_R) for the prominent emission transitions of Dy³⁺ ions in ZnPbWTe glasses. Under 384 nm excitation, PL spectra recorded for the titled glasses, exhibit two intense peaks; one in yellow at 575 nm and the other one in blue at 483 nm region. Among these two, yellow band (${}^4F_{9/2} \rightarrow {}^6H_{13/2}$) is relatively more intense than the blue one (${}^4F_{9/2} \rightarrow {}^6H_{15/2}$). The intensity of PL spectra increases up to 1 mol% of Dy³⁺ ions in ZnPbWTe glasses and beyond concentration quenching is observed. Branching ratios (β_R) and emission cross-sections (σ_{sc}) were estimated for ${}^4F_{9/2} \rightarrow {}^6H_{13/2}$ transition to understand the potential utility of these glasses for laser action in visible region. The CIE chromaticity coordinates, color correlated temperature (CCT), color purity and Y/B ratios were also estimated to understand the suitability of these glasses for w-LEDs. The luminescence quantum efficiency evaluated for the titled glasses showing highest value for 1 mol% of Dy³⁺ ions present in the as prepared glasses. From the measured emission cross-sections, quantum efficiency and CIE coordinates, it was observed that 1 mol% of Dy³⁺ ions in ZnPbWTe glasses are aptly suitable for optoelectronic devices such as lasers and w-LEDs.

For details refer to <https://doi.org/10.1016/j.jnoncrysol.2018.04.056>

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BIOGRAPHY

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Dr. Jayasimhadri Mula is an Assistant Professor in the Department of Applied Physics, Delhi Technological University, Delhi, India. He has more than 13 years of teaching and research experience. He did his master's and doctorate degree in Physics from Sri Venkateswara University (SVU), Tirupati, Andhra Pradesh, Delhi, India. He has worked as a Postdoctoral research Associate for around four years in the prestigious institutes at South Korea and also visited two times Changwon National University, South Korea as Visiting Research Professor after joining in DTU. He has won several awards. To name a few, Junior Scientist of the Year by National Environmental Science academy, Young Scientist in Physical Sciences by SERB-DST, Government of India, Outstanding Scientist Award by VIFRA and Bharat Vikas Award by ISR India. His research interests are Optical/Fluorescent Spectroscopy and Development of Rare Earth doped Materials for Optoelectronic Applications/Luminescent Devices. He has published 90 research papers in internationally reputed Scopus indexed journals and also presented 101 research papers work in several national and international conferences. His h-index as reported by Google Scholar is 29 and citations are 2252.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. K. Jha and **M. Jayasimhadri**, "Effective Sensitization of Eu^{3+} and energy transfer in $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT glasses for CuPc based solar cell and w-LED applications", *Journal of Luminescence*, vol. 194, pp. 102-107, 2018, Impact Factor: 2.732.
2. M. K. Sahu, **M. Jayasimhadri**, K. Jha, B. Sivaiah, A.S. Rao and D. Haranath, "Synthesis and enhancement of photoluminescent properties in spherical shaped $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped NaCaPO_4 phosphor particles for w-LEDs", *Journal of Luminescence*, vol. 202, pp. 475-483, 2018, Impact Factor: 2.732.
3. S. Kaur, A.S. Rao, **M. Jayasimhadri**, "Enhanced red down-conversion luminescence and high color purity from flux assisted Eu^{3+} doped calcium aluminosilicate phosphor", *Journal of Luminescence*, vol. 202, pp. 461-468, 2018, Impact Factor: 2.732.

Effective Sensitization of Eu^{3+} and Energy Transfer in $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT Glasses for CuPc Based Solar Cell and w-LED Applications

Kaushal Jha and **M. Jayasimhadri***

Abstract: $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped transparent Zinc Phosphate Barium Titanate (ZPBT) glasses have been successfully prepared via melt quenching technique. The photoluminescence properties and energy transfer mechanisms of these glasses were investigated in detail. The addition of Sm^{3+} as sensitizer expanded the excitation spectrum of Eu^{3+} in the $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT glasses. The mechanism for energy transfer from Sm^{3+} to Eu^{3+} was dipole-dipole in nature, which was confirmed by Dexter energy transfer formula and Reisfeld's theory on emission spectra and Inokuti Hirayama (I-H) model on decay curves. The $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT glasses reveal the capability to down-convert the n-UV and blue wavelength photons located in the weakest absorption of copper phthalocyanine (CuPc), to red-emitting photons in the optimal absorption of CuPc. The evaluated CIE chromaticity coordinates for the glasses move towards the red region with the increase in Eu^{3+} concentration under n-UV excitation wavelength. The above-mentioned results imply that the $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped ZPBT glasses are the potential candidate for applications in CuPc based solar cells and w-LEDs.

For details refer to <https://doi.org/10.1016/j.jlumin.2017.09.049>

Synthesis and Enhancement of Photoluminescent Properties in Spherical Shaped $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped NaCaPO_4 Phosphor Particles for w-LEDs

Mukesh K. Sahu, **M. Jayasimhadri***, Kaushal Jha, B. Sivaiah, A.S. Rao and D. Haranath

Abstract: A series of Sm^{3+} doped and $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped NaCaPO_4 phosphors have been successfully synthesized via molten salt method. The structural, morphological, optical, photoluminescence and decay properties of the synthesized phosphors were investigated. Sm^{3+} doped phosphor exhibits excellent emission properties in the orangish-red region under n-UV excitation (403 nm), and the optimized doping concentration of Sm^{3+} was found to be 1.0 mol%. The excitation spectrum confirms that $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped NaCaPO_4 phosphors can be efficiently excited by both n-UV and blue LED chips. In the co-doped $\text{NaCaPO}_4:\text{Sm}^{3+}/\text{Eu}^{3+}$ phosphors, the intensity of main characteristic emission peaks of Sm^{3+} decreased and Eu^{3+} increased with increasing Eu^{3+} ion concentration. The energy transfer (ET) from Sm^{3+} to Eu^{3+} was demonstrated to be quadrupole-quadrupole in nature by applying Dexter's ET formula and Reisfeld's approximation. Commission Internationale de l'Eclairage (CIE) chromaticity coordinates for co-doped samples lie in the red region. The decay time for the ${}^4\text{G}_{5/2}$ level of Sm^{3+} decreases with increasing Eu^{3+} concentration, which also indicate the energy transfer from Sm^{3+} to Eu^{3+} . These results indicate that $\text{Sm}^{3+}/\text{Eu}^{3+}$ co-doped NaCaPO_4 multifunctional phosphor is a promising and an attractive potential candidate for n-UV and blue excitation based w-LEDs.

For details refer to <https://doi.org/10.1016/j.jlumin.2018.06.002>

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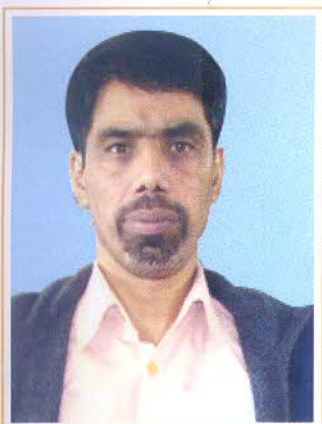
Enhanced Red Down-Conversion Luminescence and High Color Purity from Flux Assisted Eu^{3+} Doped Calcium Aluminozincate Phosphor

Sumandeep Kaur, A.S. Rao, M. Jayasimhadri*

Abstract: Trivalent europium ions (Eu^{3+}) doped calcium aluminozincate (CAZ) phosphors blended with various fluxes (NaF, NaCl and $\text{Na}_2\text{B}_4\text{O}_7$) have been synthesized by conventional solid-state reaction method. The structural, morphological and luminescent properties along with lifetimes have been investigated in detailed. The Judd-Ofelt (J-O) analysis has been carried out to get insight of optical properties. The X-ray diffraction (XRD) pattern confirms the single phase orthorhombic structure for Eu^{3+} doped CAZ phosphor with NaCl and $\text{Na}_2\text{B}_4\text{O}_7$ fluxes; whereas the phase purity has not been achieved in NaF assisted Eu^{3+} doped CAZ phosphor. The as-synthesized phosphor has uneven agglomerated micron sized particles. The photoluminescence (PL) studies exhibit significant enhancement in the red emission for Eu^{3+} doped CAZ phosphor with the addition of $\text{Na}_2\text{B}_4\text{O}_7$. The emission intensity has been found to increase approximately 1.5 times using NaCl and 2.5 times for $\text{Na}_2\text{B}_4\text{O}_7$ in Eu^{3+} doped CAZ phosphor as compared to the phosphor without any flux. The emission spectrum of optimized Eu^{3+} doped CAZ phosphor added with $\text{Na}_2\text{B}_4\text{O}_7$ flux has been compared with the commercial $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ phosphor. The CIE chromaticity coordinates and color purity calculated for $\text{Na}_2\text{B}_4\text{O}_7$ in Eu^{3+} doped CAZ phosphor is close to commercial red phosphor. The decay curves show bi-exponential behaviour with experimental lifetimes in the range of microseconds for the as-prepared phosphors. All these results indicate that the $\text{Na}_2\text{B}_4\text{O}_7$ flux assisted Eu^{3+} doped CAZ phosphor can serve as an efficient red phosphor under blue light for applications in white light emitting devices.

For details refer to <https://doi.org/10.1016/j.jlumin.2018.06.015>

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BIOGRAPHY

DR. M.S. MEHATA

Department of Applied Physics

Dr. Mohan Singh Mehata received his Ph.D. from Kumaun University (1995-2002), U.K. Subsequently, he received visiting fellowship of Michigan Technological University, USA (2003), DST Young Scientist Fellowship (2004), Hokkaido University, Japan (JST and COE) Postdoctoral Fellowships (2004-05), UCOST-Young Scientist Award (2007), Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship (2007-09) Japan, Carnegie Mellon University Research Associate, (2009-10), USA and Chinese Academy of Science (CAS) Visiting Professorship (2014-15), China. He is author and co-author of more than 80 papers and conference proceedings including seven as single author and 3 in NPG Journals. He received about 2 Crore rupees funding for his research, which includes five major research projects of DST (2004), DAE-BRNS (2012), DST (2012), SERB-DST (2016) and DST-RFBR (2017). He is a member of editorial board of several journals. He has delivered 15 invited talks and attended about 42 international/national conferences. Dr. Mehata is working as Assistant Professor of Engineering Physics at the Department of Applied Physics, Delhi Technological University.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **M.S. Mehata**, "Spectral and time-resolved properties of photoinduced hydroxyquinolines doped thin polymer films", *Optical Materials*, vol. 75, pp. 751-756, 2018, Impact Factor: 2.320.
2. R.K. Ratnesh and **M.S. Mehata**, "Tunable single and double emission semiconductor nanocrystal quantum dots: A multianalyte sensor", *Methods and Applications in Fluorescence*, vol. 6, no. 3, pp. 201-210, 2018, Impact Factor: 2.165.

Spectral and Time-Resolved Properties of Photoinduced Hydroxyquinolines Doped Thin Polymer Films

Mohan Singh Mehata

Abstract: Quinoline and its derivatives have a wide range of biological and pharmacological activities. Quinoline ring is used to design functional materials (quinoline derivatives) for OLEDs and field-induced electrooptics. It possesses antibacterial, antifungal, antimalarial, cardiostimulant, anthelmintic, anti-inflammatory, anticonvulsant and analgesic activity. Here, we have examined photoexcitation dynamics of 6-hydroxyquinoline (6-HQ) doped in polymer films of polymethyl methacrylate (PMMA), polyvinyl alcohol (PVA) and cellulose acetate (CA) at atmospheric conditions. The absorption maximum of 6-HQ in polymer films was observed at 333 ± 1 nm, whereas fluorescence (FL) maximum fell in the range of 365–371 nm. In PVA film, in addition to the typical FL, a band maximum at 432 nm appeared as a result of an excited-state intermolecular proton transfer (ESIPT) reaction facilitated in the hydrogen-bonded complex formed in the ground state between 6-HQ:PVA. The multi-exponential decay behavior of 6-HQ in all the three polymer films indicates a nanoscale heterogeneity of the polymer environments.

For details refer to <https://doi.org/10.1016/j.optmat.2017.11.038>

Tunable Single and Double Emission Semiconductor Nanocrystal Quantum Dots: A Multianalyte Sensor

Ratneshwar Kumar Ratnesh and Mohan Singh Mehata*

Abstract: We have prepared stable colloidal CdTe and CdTe/ZnS core-shell quantum dots (QDs) using hot injection chemical route. The developed CdTe QDs emit tunable single and dual photoluminescence (PL) bands, originating from the direct band edge and the surface state of QDs, as evident by the steady-state and time-resolved spectroscopy. The developed CdTe and CdTe/ZnS QDs act as optical sensors for the detection of metal ions (e.g., Fe^{2+} and Pb^{2+}) in the feed water. The PL quenching in the presence of analytes has been examined by both the steady-state and time-resolved PL spectroscopy. The linear Stern-Volmer (S-V) plots obtained for PL intensity and lifetime as a function of metal ion concentration demonstrates the diffusion-mediated collisional quenching as a dominant mechanism together with the possibility of fluorescence resonance energy transfer. Thus, the prepared core and core-shell QDs which cover a broad spectral range of white light with high quantum yield (QY) are highly sensitive to the detection of metal ions in feed water and are also important for biological applications.

For details refer to <https://doi.org/10.1088/2050-6120/aaba8a>

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BIOGRAPHY

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Ms. Monika Yadav is a research scholar with the Delhi Technological University (Delhi) in collaboration with the University of Delhi, India. She received her Bachelor's and Master's degree from University of Delhi, Delhi (India), in 2010 and 2012, respectively. She is a UGC NET- JRF fellow. She is currently working on the theory and simulation of laser-plasma interaction and its applications for electron acceleration and electromagnetic radiation generation. She is an active member of IEEE (Institute of Electrical and Electronics Engineers).

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **M. Yadav**, S. C. Sharma and D. N. Gupta, "Electron acceleration by a relativistic electron plasma wave in inverse free electron laser mechanism," *IEEE Transactions on Plasma Science*, vol. 46, no. 7, pp. 2521-2527, 2018, Impact Factor: 1.253.

Electron Acceleration by a Relativistic Electron Plasma Wave in Inverse Free Electron Laser Mechanism

Monika Yadav, Suresh C. Sharma and Devki Nandan Gupta

Abstract: It has been revealed that a relativistic plasma wave, having an extremely large electric field, may be utilized for the acceleration of plasma particles. The large accelerating field gradient driven by a plasma wave is the basic motivation behind the acceleration mechanism. Such a plasma wave can be excited by a single laser in the form of wakefield in laser-plasma interactions. In this paper, we study the enhancement of electron acceleration by plasma wave in the presence of a wiggler magnetic field. Electrons trapped in the plasma wave are accelerated due to the additional resonance provided effectively by the wiggler field, which contributes in large energy gain of electrons during acceleration. The resonant enhancement of electron acceleration by the wiggler magnetic field has been validated by single particle simulations. The dependence of energy gain on plasma wave amplitude, initial electron energy, wiggler magnetic field strength has been investigated. Using the model, the involvement and importance of inverse free-electron laser mechanism in electron acceleration by the plasma wave was analyzed. A scaling law for electron energy optimization was proposed for future electron accelerator development.

For details refer to <https://doi.org/10.1109/TPS.2018.2843362>



BIOGRAPHY

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Dr. Nitin Kumar Puri is currently working as Associate Professor in the Discipline of Engineering Physics, Department of Applied Physics, Delhi Technological University. He is associated with DTU from last 8.5 years and has teaching and research experience of more than fourteen years. He has his doctorate degree in Experimental Atomic Physics from Cyclotron Laboratory, Panjab University, Chandigarh. He has worked as an Engineer in R & D division in HongHua Company Ltd, China. He has been awarded various research grants of approximately Rupees One Crore from different funding agencies viz: SERB-DST, BRNS, UGC-DAE (Govt. of India). He has delivered many invited talks and has more than 100 research publications in peer-reviewed journals and conferences of national and international repute. He is editorial member and reviewer of reputed journals as in Biosensors and Bioelectronics, International Journal of Hydrogen Energy etc. He has worked as Vice-Chairman and Chairman of working group-III for International Nuclear Security Education Network (INSEN) as one of Indian Representative at International Atomic Energy Agency (IAEA), Vienna.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. K. Arora and **N. K. Puri**, "Electrophoretically deposited nanostructured PdO thin film for room temperature amperometric H₂ sensing", *Vacuum*, vol. 154, pp. 302-308, 2018, Impact Factor: 2.067.
2. D. Sandi, S. Srivastava, B. D. Malhotra, S. C. Sharma and **N. K. Puri**, "Biofunctionalized tungsten trioxide-reduced graphene oxide nanocomposites for sensitive electrochemical immunosensing of cardiac biomarker", *Journal of Alloys and Compounds*, vol. 763, pp. 102-110, 2018, Impact Factor: 3.779.

Electrophoretically Deposited Nanostructured PdO Thin Film for Room Temperature Amperometric H₂ Sensing

Kamal Arora and Nitin K. Puri*

Abstract: In the present work, economical and facile hydrothermal sol-gel method is employed for the synthesis of palladium oxide (PdO) nanoparticles. Uniform thin film of PdO nanoparticles are fabricated using Electrophoretic deposition (EPD) set-up. The crystal structure, surface framework, shape and size of PdO nanoparticles are determined using X-ray diffraction spectroscopy (XRD), Transmission electron microscopy (TEM) and scanning electron microscopy (SEM) respectively. An optical band-gap of 1.9 eV is observed using UV-Visible (UV-Vis) spectroscopy. Amperometric sensing of hydrogen gas is studied using PdO thin film as working electrode and characteristics properties have been obtained for different hydrogen (H₂)/Argon (Ar) gas concentrations using potentiostat/galvanostat Autolab instrument at room temperature. The PdO nanoparticles based amperometric hydrogen gas sensor shows high sensitivity of 0.222 $\mu\text{A}/\% \text{H}_2$ with fast response and recovery time.

For details refer to <https://doi.org/10.1016/j.vacuum.2018.04.023>

*Corresponding Author

Biofunctionalized Tungsten Trioxide-Reduced Graphene Oxide Nanocomposites for Sensitive Electrochemical Immunosensing of Cardiac Biomarker

Deepika Sandi, Saurabh Srivastava, B. D. Malhotra, S. C. Sharma and **Nitin K. Puri***

Abstract: We demonstrate the fabrication of a facile and efficient biosensing platform for electrochemical detection of human cardiac biomarker Troponin I (cTnI) using Tungsten trioxide-reduced graphene oxide (WO₃-RGO) nanocomposite as a matrix. The *in-situ* hydrothermal method was employed for the synthesis of the WO₃-RGO nanocomposite. Raman spectroscopy, X-ray diffraction (XRD), high-resolution transmission electron microscopy (HRTEM) and field emission scanning electron microscopy (FE-SEM) were employed to investigate structural and morphological behavior. The WO₃-RGO nanocomposite was further functionalized with 3-aminopropyl triethoxy saline (APTES) for the activation of amino groups (-NH₂) that can covalently bind to the antibodies of cTnI. This immunosensor was further studied using contact angle measurement, Fourier transform infrared spectroscopy (FT-IR) and electrochemical techniques. The synergistic behavior between RGO and WO₃ nanorods has allowed the immunosensor to exhibit enhanced heterogeneous electron transfer rate constant ($K_0 = 2.4 \times 10^{-4} \text{ cm}^2 \text{ s}^{-1}$) resulting in improved biosensor efficiency. The immuno-sensor exhibit good sensitivity as 58.24 $\mu\text{A}/\text{cm}^2$ per decade in an extended linear detection range 0.01–250 ng/mL with the stability up to 30 days. Besides this, the fabricated immuno-sensor exhibits good reproducibility and excellent selectivity towards the detection of the cTnI biomarker. Furthermore, the validation of immunosensor with cardiac patient samples demonstrates the clinical application of this nano-biosensing platform for the detection of other biomarkers too.

For details refer to <https://doi.org/10.1016/j.jallcom.2018.04.293>

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BIOGRAPHY

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Dr. Pawan Kumar Tyagi is currently serving as Assistant Professor in the Department of Applied Physics at the Delhi Technological University, Delhi. Before joining DTU, Dr. Pawan Tyagi was worked as Senior Postdoctoral Fellow at Institute of Physics Bhubaneswar India, IPCMS France & Department of Electrical Engineering, at Korea University, South Korea. He received his B.Sc. (in 1997), M.Sc. (in 2000) and Ph.D. (in 2006) degrees from Allahabad University and Banaras Hindu University and Indian Institute of Technology Mumbai, respectively. His research activity is mainly focused towards the development of multifunctional applications of carbon nanomaterials like in nanoelectronics and photovoltaic. He has published one invited review articles and 52 peer reviewed articles and 10 conference proceeding articles and filed one patent. He has been an invited speaker and session organizer at many national and international meetings. His h-index as reported by Google Scholar is 13.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	06

1. V. Kumar and **P.K. Tyagi**, "Potential application of multi-walled carbon nanotubes/activated carbon/bamboo charcoal for efficient alcohol sensing", *Journal of Alloys and Compounds*, vol. 767, pp. 215-222, 2018, Impact Factor: 3.779.
2. L. Krishnia and **P.K. Tyagi**, "Growth and characterization of polycrystalline diamond films on silicon using sugarcane bagasse as carbon precursor at atmospheric pressure by thermal chemical vapor deposition", *Diamond and Related Materials*, vol. 87, pp. 18-26, 2018, Impact Factor: 2.322.

3. R. Kumari, **P.K. Tyagi** and N.K. Puri, "Electron irradiation induced wall-to-wall joining of multiwalled carbon nanotubes", *Applied Surface Science*, vol. 453, pp. 153-158, 2018, Impact Factor: 4.439.
4. R. Kumari, **P.K. Tyagi** and N.K. Puri, "Work function and electrical properties of individual multiwalled carbon nanotube: Influenced by nature of catalyst and substrate", *Applied Physics A*, vol. 124, no. 7, pp. 466, 2018, Impact Factor: 1.604.
5. L. Krishnia, B.S. Yadav, U. Palnitkar, P.V. Satyam, B.K. Gupta, N.A. Koratkar and **P.K. Tyagi**, "As-pyrolyzed sugarcane bagasse possessing exotic field emission properties", *Applied Surface Science*, vol. 443, pp. 184-190, 2018, Impact Factor: 4.439.
6. C.K. Borah, **P.K. Tyagi**, S. Kumar and K. Patel, "Few-layer p-type phosphorene sheet: An efficient transparent conducting electrode in silicon heterojunction solar cell", *Computational Materials Science*, vol. 151, pp. 65-72, 2018, Impact Factor: 2.530.

Potential Application of Multi-Walled Carbon Nanotubes/Activated Carbon/Bamboo Charcoal for Efficient Alcohol Sensing

Vinay Kumar and Pawan K. Tyagi*

Abstract: In the present work, multi-walled carbon nanotubes (MWCNTs), bamboo charcoal (BC) and activated carbon (AC) have been synthesized via thermal CVD technique by adopting fixed catalyst route and by simple pyrolysis, respectively. A two-terminal device has been fabricated using either MWCNTs, BC or AC as sensing material which was kept between the two terminals. This fabricated device was used for alcohol sensing at room temperature. In order to determine the sensitivity and detection limit, one droplet ($\sim 10 \mu\text{L}$) of alcohol (CH_3OH , $\text{C}_2\text{H}_5\text{OH}$ and IPA) as well as IPA/water mixture was drop casted on the sensing material and the variation of resistance with respect to time has been monitored. The plausible explanation of detection has also been proposed taking into account the carriers tunneling between two disordered regions which was being wetted by alcohol molecules. We envision that the fabricated device might be a cost effective solution for the detection of pure as well as dilute isopropyl alcohol.

For details refer to <https://doi.org/10.1016/j.jallcom.2018.06.123>

Growth and Characterization of Polycrystalline Diamond Films on Silicon using Sugarcane Bagasse as Carbon Precursor at Atmospheric Pressure by Thermal Chemical Vapor Deposition

Lucky Krishnia and Pawan K. Tyagi*

Abstract: Here we demonstrate that by using sugarcane bagasse as a carbon precursor, highly crystalline diamond films possessing H3 [N-V-N] and [Si-V]⁻ optical centers can be grown on Si (100) substrates using a simple thermal chemical vapor deposition (thermal-CVD) system at atmospheric pressure and reduced temperature ($\sim 900 \text{ }^\circ\text{C}$). In this process, the rich chemistry of effluent gas species produced during the pyrolysis of sugarcane bagasse is found to play a vital role. Diamond films have also been characterized by using X-ray diffraction (XRD), scanning electron microscope (SEM), micro-Raman, and photoluminescence (PL) spectrometer. Presence of nitrogen and silicon related defect was probed by PL and H3, i.e. [N-V-N] at 505 nm and [Si-V]⁻ at 736 nm optical centers have been confirmed. The other observed peaks at 445.7 nm, 468 nm, and 884 nm are assigned to nitrogen-containing defects.

For details refer to <https://doi.org/10.1016/j.diamond.2018.05.001>

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Electron Irradiation Induced Wall-To-Wall Joining of Multiwalled Carbon Nanotubes

Reetu Kumari, **Pawan K. Tyagi*** and Nitin K. Puri

Abstract: In present work, wall-to-wall joining of two parallel multiwalled carbon nanotubes (MWCNTs) has been successfully demonstrated using electron beam inside high resolution transmission electron microscope. The used MWCNTs have been grown using cobaltocene and benzene as catalyst and carbon precursor, respectively via thermal CVD technique. We have proposed that in present case, irradiation induced joining is achieved if adequate balance between sputtered carbon atoms from the outer walls of MWCNTs and generation as well as migration of defects along the tube axis is obtained. Casimir effect is not found to play dominating role in the joining process. The proposed method can potentially be used for developing wall-to-wall interconnection between MWCNTs using electron beam.

For details refer to <https://doi.org/10.1016/j.apsusc.2018.05.055>

Work Function and Electrical Properties of Individual Multiwalled Carbon Nanotube: Influenced by Nature of Catalyst and Substrate⁺

Reetu Kumari, **Pawan K. Tyagi*** and Nitin K. Puri

Abstract: To employ the multiwalled carbon nanotubes (MWCNTs) in electronic devices, their growth on conductive substrates is a prerequisite. Since electronic properties of MWCNT might be influenced by catalyst and substrate, therefore, to understand their influence on the work function and electrical resistance, individual MWCNT needs to be studied. In this report, we have demonstrated the growth of MWCNTs on conducting substrates such as copper, stainless steel, and insulating SiO₂ using thermal CVD technique. First, as-grown MWCNTs on different substrates have been characterized with scanning electron microscopy and Raman spectroscopy. Furthermore, electrical measurements on as-grown individual MWCNT has been performed using electrostatic force microscopy and conductive atomic force microscopy. Performed measurements reveal that work function and electrical resistance of MWCNT vary from 4.32 to 5.32 eV and 4–498 kΩ, respectively, depending on the nature of catalyst as well as substrates. We envision that performed study might boost the on-going research activity in the area of MWCNT-based nanoelectronic devices.

For details refer to <https://doi.org/10.1007/s00339-018-1850-8>

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+Eligible for Certification only

As-pyrolyzed Sugarcane Bagasse Possessing Exotic Field Emission Properties⁺

Lucky Krishnia, Brajesh S. Yadav, Umesh Palnitkar, P.V. Satyam, Bipin Kumar Gupta, Nikhil A. Koratkar and **Pawan K. Tyagi***

Abstract: The present study aims to demonstrate the application of sugarcane bagasse as an excellent field emitter. Field emission property of as-pyrolyzed sugarcane bagasse (p-SBg) before and after the plasma treatment has been investigated. It has been observed that electronic nature of p-SBg transformed from semiconducting to metallic after plasma treatment. Maximum current and turn-on field defined at $10 \mu\text{A}/\text{cm}^2$ was found to be $800 \mu\text{A}/\text{cm}^2$ and $2.2 \text{ V}/\mu\text{m}$ for as-pyrolyzed sugarcane bagasse (p-SBg) and $25 \mu\text{A}/\text{cm}^2$ and $8.4 \text{ V}/\mu\text{m}$ for H_2 -plasma treated p-SBg. These values are found to be better than the reported values for graphene and activated carbon. In this report, pyrolysis of bagasse has been carried in a thermal chemical vapor deposition (Th-CVD) system in inert argon atmosphere. Scanning electron microscopy (SEM), X-ray Diffraction (XRD), High-resolution transmission electron microscopy (HRTEM) and X-ray photoelectron spectroscopy (XPS) have been used to study the structure of both pre and post plasma-treated p-SBg bagasse's sample. HRTEM study reveals that carbonaceous structures such as 3D-nanographene oxide (3D-NGO), graphite nanodots (GNDs), carbon nanotubes (CNTs), and carbon onions are present in both pre-treated and plasma-treated p-SBg. Hence, we envision that the performed study will be a forwarding step to facilitate the application of p-SBg in display devices.

For details refer to <https://doi.org/10.1016/j.apsusc.2018.02.235>

Few-layer P-type Phosphorene Sheet: An Efficient Transparent Conducting Electrode in Silicon Heterojunction Solar Cell⁺

Chandra Kamal Borah, **Pawan K. Tyagi***, Sanjeev Kumar and Kamlesh Patel

Abstract: In this article, a structure of heterojunction solar cell configured as Ti (front contact)/p-phosphorene/n-cSi/Ag (back contact) has been simulated by using AFOSR-HET v2.5 software. Here, electronic nature of phosphorene layer which is anisotropic along armchair and zigzag directions has been considered as 3D in nature instead of 2D. After optimizing the parameters of p-type single layer phosphorene and n-type crystalline silicon (n-cSi) maximum power conversion efficiency 15.51% and 14.06% has been achieved for armchair and zigzag phosphorene, respectively. The temperature dependence of the cell performance has been studied and maximum efficiency has been found at 300 K for both armchair and zigzag phosphorene layer. Further, we have studied the effect of metal contact on the cell performance. We have also simulated the solar cell taking experimentally available parameters of n-cSi and efficiencies of 13.29% and 14.06% are found in cases of the armchair and zigzag phosphorene layers, respectively. Finally, we have demonstrated that multilayer p-type phosphorene layer could act as an effective transparent conducting electrode in the silicon heterojunction solar cell.

For details refer to <https://doi.org/10.1016/j.commat.2018.04.059>

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Dr. Rishu Chaujar is presently working as an Associate Professor in Department of Applied Physics, Delhi Technological University. She is M.Sc. Electronics (Gold Medalist) (2003-2005), Ph.D. (Electronics) (2006-2009) from Delhi University and received Shanti Devi Bhargava Memorial Medal (2006) for excellence in academics in M.Sc. Electronics (2003-2005). She has authored or co-authored more than 230 papers in various reputed international and national journals and conferences. She has been awarded the Premier Research Award and Commendable Research Award for excellence in research, Delhi Technological University, 2018. She is also the Principal Investigator of DST Fast Track Young Scientist Research Project. She has also received 2nd Academic Brilliance Awards - 2014: Certificate of excellence by education expo, Research wing for excellence in professional education and industry and Pearson Teaching Award for Innovation in Teaching at Undergraduate Level, 2013. She has also been awarded with a Young Scientist Award by VIFRA-2015, Venus International Foundation, Young Women in Science (Specialization-Electronics), Venus International Women Awards (VIWA-2017) and Bharat Vikas Award, Institute of Self Reliance, Bhubaneshwar, India, 2016.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	06

1. J. Madan and **R. Chaujar**, "Temperature associated reliability issues of heterogeneous gate dielectric - Gate all around - Tunnel FET", *IEEE Transactions on Nanotechnology*, vol. 17, no. 1, pp. 41-48, 2018, Impact Factor: 2.857.
2. A. Kumar, M.M. Tripathi and **R. Chaujar**, "Reliability issues of $\text{In}_2\text{O}_3/\text{Sn}$ gate electrode recessed channel MOSFET: Impact of interface trap charges and temperature", *IEEE Transactions on Electron Devices*, vol. 65, no.3, pp. 860-863, 2018, Impact Factor: 2.62.

3. A. Kumar, M.M. Tripathi and **R. Chaujar**, “In₂O₅Sn based transparent gate recessed channel MOSFET: RF small-signal model for microwave applications”, *AEU-International Journal of Electronics and Communications*, vol. 93, pp. 233-241, 2018, Impact Factor: 2.115.
4. A. Kumar, M.M. Tripathi and **R. Chaujar**, “Comprehensive analysis of sub-20 nm black phosphorus based junctionless-recessed channel MOSFET for analog/RF applications”, *Superlattices and Microstructures*, vol. 116, pp. 171-180, 2018, Impact Factor: 2.099.
5. A. Kumar, M.M. Tripathi and **R. Chaujar**, “Ultra-low power dielectric modulated nano-gap embedded sub-20nm TGRC-MOSFET for biosensing application”, *Journal of Computational Electronics*, vol. 17, no. 4, pp. 1807–1815, 2018, Impact Factor:1.431.
6. R. Pandey and **R. Chaujar**, “Rear contact silicon solar cells with a-SiC_xH based front surface passivation for near-ultraviolet radiation stability”, *Superlattices and Microstructures*, vol. 122, pp. 111-123, 2018, Impact Factor: 2.099.

Temperature Associated Reliability Issues of Heterogeneous Gate Dielectric - Gate All Around - Tunnel FET

Jaya Madan and **Rishu Chaujar***

Abstract: In this paper, the temperature associated reliability issues of heterogeneous gate dielectric-gate all around-tunnel FET (HD GAA TFET) has been addressed, and the results are simultaneously compared with gate all around tunnel FET (GAA TFET). This is done by investigating the effect of interface trap charges such as donor (positive interface charges) and acceptor (negative interface charges) at various operating temperatures on the device analog parameters and RF figure of merits. It is observed that, at high gate bias, TFET exhibits weak temperature dependence owing to the weak dependence of band to band tunneling phenomenon on the temperature in comparison to the large temperature variation for lower gate bias due to the temperature dependence of Shockley-Read-Hall (SRH) phenomenon. Results reveal that extremely high OFF current at elevated temperatures degrades the device performance, making the device less reliable for high-temperature applications. Moreover, at elevated temperature, the decrease in threshold voltage and intrinsic delay, and increase in cut off frequency is found, thereby upgrading the device characteristics. All the simulations have been done on ATLAS device simulator.

For details refer to <https://doi.org/10.1109/TNANO.2017.2650209>

Reliability Issues of $\text{In}_2\text{O}_5\text{Sn}$ Gate Electrode Recessed Channel MOSFET: Impact of Interface Trap Charges and Temperature

Ajay Kumar, M.M. Tripathi and **Rishu Chaujar***

Abstract: In this paper, reliability issues of $\text{In}_2\text{O}_5\text{Sn}$ (indium-tin oxide: a transparent material) transparent gate recessed channel (TGRC)-MOSFET has been analyzed by considering the effect of interface trap charges (both positive and negative) present at the Si/SiO₂ interface. Following device, characteristics are studied in terms of static, linearity, and intermodulation figure of merits. It is found that with the amalgamation of the transparent gate indium tin oxide on conventional recesses channel (CRC) MOSFET, it exhibits improved immunity against interface trap charges in comparison to CRC-MOSFET. In addition, the influence of ambient temperature (150–300 K) along with trap charges on TGRC-MOSFET has also been explored with an aim to analyze at which temperature of the device is more stable in the presence of interface defects (trap charges). Results obtained reveal that TGRC shows improved device performance at low temperature with trap charges being less influenced. Thus, this paper demonstrates that TGRC MOSFET can act as a promising candidate for low-power linear analog applications, where low temperature is required.

For details refer to <https://doi.org/10.1109/TED.2018.2793853>

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In₂O₅Sn Based Transparent Gate Recessed Channel MOSFET: RF Small-Signal Model for Microwave Applications

Ajay Kumar, M.M. Tripathi and **Rishu Chaujar***

Abstract: This paper discusses the small signal RF model of Transparent Gate Recessed Channel (TGRC) MOSFET using a 3D TCAD device simulator. Small signal model is studied in terms of microwave parameters such as S (scattering) parameters, Z (impedance) parameters, Y (admittance) parameters, and h (hybrid) parameters with an aim to analyze the behavior of TGRC MOSFET at microwave frequency. All the results of TGRC-MOSFET have been compared with Conventional Recessed Channel (CRC) MOSFET having aluminum as gate metal electrode. Modeled results have also been compared with simulation results and found good agreement with the 3D-simulation results. Moreover, it is perceived from the results that 99.4% enhancement in the input impedance of TGRC-MOSFET and input admittance is improved by 32.9% in the proposed device (TGRC-MOSFET) in comparison to CRC-MOSFET. It has also been observed that the transit (cut-off) frequency (f_T) and maximum oscillator frequency (f_{MAX}) enhances significantly by 42.85% and 123% respectively in TGRC MOSFET owing to the remarkable reduction in intrinsic capacitances. Results reveal that the proposed device design improves the small signal behavior thus, may provide detailed insight to RF engineers for microwave applications and testing of RF ports.

For details refer to <https://doi.org/10.1016/j.aecue.2018.06.014>

Comprehensive Analysis of sub-20 nm Black Phosphorus Based Junctionless-Recessed Channel MOSFET for Analog/RF Applications⁺

Ajay Kumar, M.M. Tripathi and **Rishu Chaujar***

Abstract: In this work, a comprehensive analog and RF performance of a novel Black Phosphorus-Junctionless-Recessed Channel (BP-JL-RC) MOSFET has been explored at 45 nm technology node (Gate length = 20 nm). The integration of black phosphorus with junctionless recessed channel MOSFET, leads to higher drain current of about 0.3 mA and excellent switching ratio (of the order of 10^{11}) due to reduced off-current which leads to improvement in sub-threshold slope (SS) (67mV/dec). Further, RF performance metrics have also been studied with an aim to analyze high-frequency performance. The following FOMs have been evaluated: cut-off frequency (f_T), maximum oscillator frequency (f_{MAX}), stern stability factor, various power gains and parasitic capacitances at THz frequency range. Thus, in addition to the high packing density offered by RC MOSFET, the proposed design finds numerous application at THz frequency making it a promising candidate at wafer scale integration level.

For details refer to <https://doi.org/10.1016/j.spmi.2018.02.018>

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+Eligible for Certification only

Ultra-low Power Dielectric Modulated Nano-Gap Embedded Sub-20nm TGRC-MOSFET for Biosensing Application⁺

Ajay Kumar, M.M. Tripathi and **Rishu Chaujar***

Abstract: This work examines a transparent gate recessed channel (TGRC) metal-oxide-semiconductor field-effect transistor (MOSFET) for biosensing, including a nanogap cavity for detection of biomolecules and a transparent gate to enhance the overall current efficiency of the RC-MOSFET. For the detection of neutral biomolecules, electrical characteristics such as I_{ON}/I_{OFF} , shift in threshold voltage and change in surface potential have been studied and thereafter, sensitivity of has been evaluated. The biosensor showed enhanced sensitivity for biomolecules with increase in their dielectric value, due to greater on-current owing to the change in capacitances. The capacitances were therefore also evaluated. In addition, immobilization of biomolecules degrades the noise immunity of MOSFET and thereby their overall biosensing performance, while the noise immunity of the TGRC device was very high even in the presence of biomolecules. Furthermore, modulation of the cavity gap length was also investigated, revealing that its increase (from 8 to 20 nm) significantly enhanced the sensitivity of the proposed biosensor. Overall, the results of this analysis reveal that such TGRC-MOSFET biosensors can exhibit high sensitivity (1.45) at very low drain bias (0.2 V), enabling their use for biosensor applications to diagnose various diseases which require lower noise, high speed, low power, and high density.

For details refer to <https://doi.org/10.1007/s10825-018-1237-2>

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Rear Contact Silicon Solar Cells with a-SiC_x:H based Front Surface Passivation for Near-Ultraviolet Radiation Stability⁺

Rahul Pandey and Rishu Chaujar*

Abstract: Surface recombination (due to dangling bonds) and lower absorption (due to the low absorption coefficient of silicon (Si)) are the major hindrances in silicon-based photovoltaic (PV) devices. To overcome this, numerous complex texturing schemes are projected to enhance the light trapping. However nanostructured cells are not efficient due to the large surface to volume ratio which enhances surface recombination. Thus, the nanostructured cells require additional passivation scheme to mitigate the recombination losses. Here, we have designed a nontextured, 15% efficient, amorphous silicon carbide hydrogenated (a-SiC_x:H) passivated, 10- μ m thick rear contact Si solar cell device. Considerable reduction in photo reflectance is obtained in the near ultraviolet (UV)/visible spectral region together with near UV stability at higher surface recombination velocity (SRV). External quantum efficiency (EQE) > 90% is achieved by the a-SiC_x:H based device (within the wavelength spectrum of 480–620 nm). Improvement in spectrum response give rise to 28.1 mA cm⁻² short circuit current density (J_{sc}). Further, the performance of a-SiC_x:H passivated device is compared with a conventional dielectric anti-reflective coating (ARC) and high-low junction-based surface passivation techniques. Results indicate that the presence of a-SiC_x:H reduces the hole concentration near the front surface which eventually decreases the surface recombination. Highly efficient and reliable solar cells can be achieved by the design schemes reported in this paper, which balance both the photonic and electronic effects together.

For details refer to <https://doi.org/10.1016/j.spmi.2018.08.016>

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BIOGRAPHY

PROF. SURESH C. SHARMA

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Prof. Suresh C. Sharma is working with the Department of Applied Physics, Delhi Technological University, Delhi, India. He was awarded the Young Scientist project as a principal investigator by the Department of Science and Technology, Govt. of India for a two year duration (1997-99). He was a Monbusho Postdoctoral Fellow under Japanese Govt. fellowship, Dept. of Physics, Faculty of Science, Ehime University, Matsuyama, Japan from October 1997 to March 1999. In addition, he has been a JSPS (Invitation) Postdoctoral Fellow and visiting researcher from May 2004 to October 2005 with the Center for Atomic and Molecular Technologies (CAMT), Osaka University, Japan. Besides, he was awarded Senior Research Associate under the Scientist's Pool Scheme by CSIR, Govt. of India (1999-2002) and worked in the Department of Physics and Astrophysics, University of Delhi from April 1999 to January 2002. He has received Commendable Research Award for Excellence in Research, DTU in 2018. He has worked on several research projects in India and abroad. He has published 159 research papers in journals of international & national repute and proceedings of international & national conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	07

1. K.R. Segwal and **S.C. Sharma**, "Current Driven Low Frequency Electrostatic Waves in a Collisional Strongly Coupled Magnetized Dusty Plasma", *IEEE Transactions on Plasma Science*, vol. 46, no. 4, pp. 797-805, 2018, Impact Factor: 1.253.
2. R. Gupta, N. Gupta and **S.C. Sharma**, "Modeling to study the role of catalyst in the formation of graphitic shells during carbon nanofiber growth subjected to reactive plasma", *Physics of Plasmas*, vol. 25, no. 4, pp. 043504, 2018, Impact Factor: 1.941.

3. U. Sharma and **S.C. Sharma**, "A parametric study to unravel the alignment mechanism of carbon nanotubes during its plasma-assisted growth", *Physics of Plasmas*, vol. 25, no. 10, pp. 103509, 2018, Impact Factor: 1.941.
4. A. Gahlot and **S.C. Sharma**, "Resonant decay of a Langmuir wave in presence of dust grains in cylindrical plasma", *Contributions to Plasma Physics*, vol. 58, no. 4, pp. 302-310, 2018, Impact Factor: 1.318.
5. K. R. Segwaland **S.C. Sharma**, "Theoretical Modeling of an Ion Beam Driven Kelvin Helmholtz Instability in a Plasma Cylinder Having Negatively Charged Dust Grains", *IEEE Transactions on Plasma Science*, vol. 46, no. 4, pp. 775-781, 2018, Impact Factor: 1.253.
6. J. Panwar and **S.C. Sharma**, "Terahertz radiation emission using plasma filled dielectric liner with the effects of pre-modulated relativistic electron beam", *Contributions to Plasma Physics*, vol. 58, no. 9, pp. 917-924, 2018, Impact Factor: 1.318.
7. N. Gupta and **S.C. Sharma**, "Investigations on the plasma enabled growth of vertical graphene sheets on CNT surface", *Physics of Plasmas*, vol. 25, no. 7, pp. 073509, 2018, Impact Factor: 1.941.

Current-Driven Low-Frequency Electrostatic Waves in a Collisional Strongly Coupled Magnetized Dusty Plasma

Kavita Rani Segwal and Suresh C. Sharma*

Abstract: Current-driven low-frequency electrostatic waves are studied in a collisional strongly coupled magnetized dusty plasma. The theoretical model for the longitudinal and transverse modes is developed in the regime $\omega\tau_m \ll 1$ for the collisional strongly coupled magnetized dusty plasma in the presence of drifting currents. It is observed that the dispersion properties of low-frequency electrostatic waves are modified under the effect of magnetic field-aligned drifting ion currents in a strongly coupled collisional magnetized dusty plasma. The frequency rate and growth rate of longitudinal and transverse modes increase with normalized wave number. Moreover, the growth rate of unstable waves is destabilized with normalized drift velocity of ions for both longitudinal and transverse modes. The critical drift velocity of ions decreases with normalized wave number but increases with increase in the strong correlation parameter Γ . The effect of strong coupling parameter on the frequency and growth rate of low-frequency electrostatic modes in the presence of current drift and collisions is also investigated.

For details refer to <https://doi.org/10.1109/TPS.2018.2790978>

*Corresponding Author

Modeling to Study the Role of Catalyst in the Formation of Graphitic Shells during Carbon Nanofiber Growth Subjected to Reactive Plasma

Ravi Gupta, Neha Gupta and **Suresh C. Sharma***

Abstract: An analytical model to study the role of a metal catalyst nanofilm in the nucleation, growth, and resulting structure of carbon nanofibers (CNFs) in low-temperature hydrogen diluted acetylene plasma has been developed. The model incorporates the nanostructuring of thin catalyst films, growth of CNF, restructuring of catalyst nanoparticles during growth, and its repercussion on the resulting structure (alignment of rolled graphene sheets around catalyst nanoparticles) by taking into account the plasma sheath formalization, kinetics of neutrals and positively charged species in the reactive plasma, flux of plasma species onto the catalyst front surface, and numerous surface reactions for carbon generation. In order to examine the influence of the catalyst film on the growth of CNFs, the numerical solutions of the model equations have been obtained for experimentally determined initial conditions and glow discharge plasma parameters. From the solutions obtained, we found that nanostructuring of thin films leads to the formation of small nanoparticles with high surface number density. The CNF nucleates over these small-sized nanoparticles grow faster and attain early saturation because of the quick poisoning of small-sized catalyst particles, and contain only a few graphitic shells. However, thick nanofilms result in shorter CNFs with large diameters composed of many graphitic shells. Moreover, we found that the inclination of graphitic shells also depends on the extent up to which the catalyst can reconstruct itself during the growth. The small nanoparticles show much greater elongation along the growth axis and also show a very small difference between their tip and base diameter during the growth due to which graphitic shells align at very small angles as compared to the larger nanoparticles. The present study is useful to synthesize the thin and more extended CNFs/CNTs having a smaller opening angle (inclination angle of graphene layers) as the opening angle has a significant influence on their field emission properties. The comparisons of these theoretical findings to the experimental observations confirm the adequacy of the proposed model.

For details refer to <https://doi.org/10.1063/1.5020561>

*Corresponding Author

A Parametric Study to Unravel the Alignment Mechanism of Carbon Nanotubes during its Plasma-Assisted Growth

Umang Sharma and Suresh C. Sharma*

Abstract: The alignment and catalyst-assisted growth mechanism of carbon nanotubes (CNTs) in a hydrogen-diluted methane plasma are demonstrated in the present work. The consequence of plasma parameters (plasma density and temperature) and bias potential of the substrate on the sheath electric field is examined. The role of the electric field in the plasma sheath to provide the necessary electrostatic force and its repercussion on the carbon nanotubes alignment in the plasma are studied by taking into contemplation the steady state fluid equations, kinetics of the plasma sheath, charged species dynamics (positive ions and electrons) and neutral atoms in a reactive plasma, kinetics of the catalyst particle, and creation of atomic species of carbon and hydrogen over the surface of catalyst nanoparticle and incorporating various processes vital for the growth of carbon nanotube in plasma. Taking into deliberation the initial conditions and the glow discharge parameters determined experimentally for the model, the numerical solutions for the equations are obtained. The outcomes of the studies revealed that the alignment of the nanotube depends on the force exerted at the tip of CNTs, i.e., the catalyst nanoparticle. This force is a consequence of the plasma sheath electric field which is dependent on the plasma parameters and the bias voltage at the substrate. This electrostatic force is also dependent upon the dimensions of the nanotube growing in the plasma environment and modifies itself continuously conferring to the instantaneous nanotube measurement and alignment during the growth. The present study can be apprehended to manufacture carbon nanotubes aligned vertically in plasma for better applications in the areas of field emission devices. The results of the present study have been assessed and compared with the existing experimental observations which accredit the proposed mechanisms.

For details refer to <https://doi.org/10.1063/1.5049866>

Resonant Decay of a Langmuir Wave in the Presence of Dust Grains in a Cylindrical Plasma⁺

Ajay Gahlot and Suresh C. Sharma*

Abstract: The resonant parametric decay of a Langmuir wave into a backward propagating Langmuir wave and an ion acoustic (IA) wave is studied in a cylindrical dusty plasma. The analysis shows that the frequency of the IA mode decreases with the parameter δ_c (where δ_c is the ratio of the ion density to the electron density) for negatively charged dust grains. The growth rate of the resonance decay instability (RDI) and the threshold required for its onset also decrease with δ_c and are strongly dependent on the electron to ion temperature ratio for both positively and negatively charged dust grains. The results obtained also illustrate the dependence of the threshold of the resonance decay instability (μ_{th}) on the plasma cylinder radius.

For details refer to <https://doi.org/10.1002/ctpp.201700195>

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+Eligible for Certification only

Theoretical Modeling of an Ion-Beam-Driven Kelvin–Helmholtz Instability in a Plasma Cylinder having Negatively Charged Dust Grains⁺

Kavita Rani Segwal and Suresh C. Sharma*

Abstract: An ion beam propagating through a magnetized plasma cylinder having negatively charged dust grains drives the Kelvin–Helmholtz instability (KHI) via Cerenkov interaction. The frequency and the growth rate of the KHI increase with the relative density of negatively charged dust grains δ . However, for large relative density of dust grains δ , the growth rate of KHI saturates. Moreover, beam density plays an important role in enhancing the growth rate of the KHI. It is also observed that finite boundary effects modify the dispersion properties of the KHI. The growth rate of KHI in a plasma cylinder is destabilized under the effect of dust charge fluctuations for relatively large velocity shears and low density of negatively charged dust grains δ . A comparative study of results is done for finite and infinite geometries of plasma waveguide.

For details refer to <https://doi.org/10.1109/TPS.2018.2790980>

Terahertz Radiation Emission using Plasma-Filled Dielectric Liner with the Effects of Pre-Modulated Relativistic Electron Beam⁺

Jyotsna Panwar and Suresh C. Sharma*

Abstract: We propose a theoretical model for the efficient emission of high-power terahertz (THz) radiation. The pre-modulation of the beam is accounted for by the interaction of the two laser beams with the relativistic electron beam (REB). The pre-modulated REB travels through a dielectric liner waveguide, which is filled with a plasma. The REB travels near the dielectric lining boundary and therefore transfers maximum energy to the electromagnetic radiation wave via Cerenkov interaction. The growth rate and efficiency of the radiation wave are examined and found to be altered by the parameters of the REB and the dielectric medium. The growth rate varies as one-third power of the beam density and as two-thirds power of the amplitude of the pump wave field. The proposed scheme seems to be an effective method for the generation of tunable THz radiation.

For details refer to <https://doi.org/10.1002/ctpp.201800033>

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+Eligible for Certification only

Investigations on the Plasma Enabled Growth of Vertical Graphene Sheets on CNT Surface⁺

Neha Gupta and **Suresh C. Sharma***

Abstract: A theoretical model is developed to describe the plasma-assisted nucleation and growth kinetics of a vertical graphene (VG) sheet on a carbon nanotube (CNT) surface. The present model accounts the formalization of a charge separation region, i.e., plasma sheath between the bulk plasma and substrate surface in one-dimension along with the kinetics of all the plasma species (neutrals, positively charged species, and electrons), rate of charge accumulation on the graphene sheet surface, and growth of the VG sheet on the CNT surface owing to defect generation and various processes on the CNT surface. Using the model, we demonstrated that variations in the plasma enhanced chemical vapor deposition process control parameters such as the total gas pressure, input power, and substrate bias can be used for significant variation in the plasma composition and characteristics that in turn control the ion bombardment and generation of carbon species on the CNT surface and consequently tune the VG sheet growth characteristics such as height, thickness, and number density profiles of the VG sheet on the CNT surface. The results of the present study indicate that as the total gas pressure is lowered and the input power and substrate bias are enhanced, the number densities and height of the VG sheet on the CNT surface are increased; however, the thickness of the VG sheet is reduced. Some of our theoretical findings are in good agreement with the existing experimental results.

For details refer to <https://doi.org/10.1063/1.5030559>

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BIOGRAPHY

MR. SKANDA SHEKHAR *Department of Applied Physics*

Mr. Skanda Shekhar is pursuing Bachelor's degree in Engineering Physics from the Delhi Technological University. While there, he was keenly involved in research being carried out at the Microelectronics Research Laboratory (MRL). He has worked on numerous projects at the lab resulting in a number of publications. In particular, his work focused on engineering and optimising Tunnel Field Effect Transistors (TFETs) for specific applications. Skanda is currently probing the confluence of engineering, business and law at the Indian Institute of Technology, Kharagpur, where he studies Intellectual Property (IP) law and management. In this regard, he is working on the global patent law regime and its impact on the penetration of, and access to, technology. His work probes how this economics of innovation is driven by various factors of law and policy. Skanda continues to collaborate with the research group at the MRL to keep his research interests in nano-electronics alive.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **S. Shekhar**, J. Madan and R. Chaujar, "Source/Gate material engineered double gate TFET for improved RF and linearity performance: A numerical simulation", *Applied Physics A: Materials Science & Processing*, vol. 124, no. 11, 2018, Impact Factor: 1.604.

Source/Gate Material Engineered Double Gate TFET for Improved RF and Linearity Performance: A Numerical Simulation

Skanda Shekhar, Jaya Madan and Rishu Chaujar

Abstract: This work seeks to present a comparative analysis of linear and analog/RF performances of a silicon (Si)-source double gate tunnel field effect transistors (DG-TFET), germanium (Ge)-source DG-TFET and Gate Material Engineered germanium (GME-Ge)-source DG-TFET. The objective of this analysis is to probe the viability of the Ge-source-DG-TFET and GME-Ge-source-DG-TFET as possible components of RF/microwave systems vis-à-vis conventional Si-source-DG-TFETs. The Ge-source-DG-TFET has been shown to have superior performance parameters as compared to the Si-source-DG-TFET. It is realized that the GME-Ge-source-DG-TFET preserves the superior performance of the Ge-source-DG-TFET and displays improved device reliability in contrast to the latter. With these ideas in the backdrop, a study of parasitic capacitances, transconductance (g_{m1}) and its higher order coefficients (g_{m2} and g_{m3}), and signal performance metrics such as VIP2, VIP3, third-order Input Intercept Point (IIP3) and third-order Intermodulation Distortion (IMD3) sheds light on the linear performances of the three devices. Further, the analog/RF performances of the three devices are investigated through analog/RF Figures of Merit (FOM) including current gain, unilateral power gain and maximum available power gain (Gma). This analysis reveals that the GME-Ge-source-DG-TFET is suitable for high-frequency, low-power operation required in modern communication systems.

For details refer to <https://doi.org/10.1007/s00339-018-2158-4>



BIOGRAPHY

DR. VINOD SINGH

Department of Applied Physics

Dr. Vinod Singh has been working as an Associate Professor in the Department of Applied Physics, Delhi Technological University, Delhi, India since 2003. He received his Ph.D. degree from Indian Institute of Technology (IIT) Delhi. He was honoured with the University Gold Medal at both the B.Sc. and M.Sc. (Physics) level and also honored with Bhamashah Award (Gold Medal), presented by Sir V.S. Naipaul, Nobel Laureate. He has qualified the NET-JRF, GATE and JEST. He is an active researcher supervising B.Tech. and Ph.D. students at DTU. He has a patent to his credit which was granted in 2018. He has authored one book and published several research papers in international peer reviewed journals of high repute. He was honoured with best presentation award by Bharat Ratan Prof. C.N.R. Rao, delivered four invited talks, Chaired the technical sessions and presented fifteen papers in international and national conferences of high repute. He is the convener of an international conference and the member of several professional societies like MRS USA, ISES Germany, MRSI, ISTE, ISCA, EMSI etc.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **V. Singh**, S. Dhall, A. Kaushal and B.R. Mehta, "Room temperature response and enhanced hydrogen sensing in size selected Pd-C core-shell nanoparticles: Role of carbon shell and Pd-C interface", *International Journal of Hydrogen Energy*, vol. 43, no. 2, pp. 1025-1033, 2018, Impact Factor: 4.229.

Room Temperature Response and Enhanced Hydrogen Sensing in Size Selected Pd-C Core-Shell Nanoparticles: Role of Carbon Shell and Pd-C Interface

Vinod Singh, Shivani Dhall, Akshey Kaushal and Bodh R. Mehta

Abstract: In the present work, the effect of carbon shell around size selected palladium (Pd) nanoparticles on hydrogen (H₂) sensing has been studied by investigating the sensing response of Pd-C core-shell nanoparticles having a fixed core size and different shell thickness. The H₂ sensing response of sensors based on Pd and Pd-C nanoparticles deposited on SiO₂ and graphene substrate has been measured over a temperature range of 25 °C–150 °C. It is observed that Pd-C nanoparticle sensor shows higher sensitivity with increase in shell thickness and faster response/recovery in comparison to that of Pd nanoparticle samples. Pd-C nanoparticles show room temperature H₂ sensitivity in contrast to Pd nanoparticles which respond only at higher temperatures. Role of carbon shell is also understood by investigating H₂ sensing properties of Pd and Pd-C nanoparticles on graphene substrates. These results show that higher catalytic activity and electronic interaction at Pd-C interface, a complete coverage and protection of Pd surface by carbon and presence of structural defects in nanoparticle core are important for room temperature and higher sensing response.

For details refer to <https://doi.org/10.1016/j.ijhydene.2017.11.143>



BIOGRAPHY

DR. YOGITA KALRA

Department of Applied Physics

Dr. Yogita Kalra is working as an Assistant Professor with the Department of Applied Physics, Delhi Technological University, Delhi since 2010. She started her journey of teaching in Gargi College, University of Delhi in 2006-2007 and Bharti Vidyapeeth College of Engineering, Guru Gobind Singh Indraprastha University from 2008 to 2010. She did her M.Sc. in Physics from the Indian Institute of Technology (IIT), Delhi, India in 2001. In 2007, she received her Ph.D. degree from the Department of Applied Physics, University of Delhi, India. She is the coordinator of the Technology Information, Forecasting and Assessment Council (TIFAC) – Centre of Relevance and Excellence (CORE) in Fiber Optics and Optical Communication, DTU under Mission Reach program of Technology Vision 2020. She has authored about seventy research publications in the leading national and international journals of repute and referred conference proceedings. She is a Life member of Optical Society of India (OSI), The Indian Science Congress Association (ISCA) and a member of Optical Society of America (OSA) and SPIE-The International Society for Optics and Photonics.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. R. Reena, **Y. Kalra** and A. Kumar, “Ellipsoidal all-dielectric Fano resonant core-shell metamaterials”, *Superlattices and Microstructures*, vol. 118, pp. 205-212, 2018, Impact Factor: 2.099.
2. N. Shankhwar, **Y. Kalra** and R. K. Sinha, “All dielectric zero-index metamaterial for TE/TM polarization”, *Journal of Optics*, vol. 20, pp. 11501, 2018, Impact Factor: 2.323.

Ellipsoidal All-dielectric Fano Resonant Core-shell Metamaterials

Reena Reena, **Yogita Kalra*** and Ajeet Kumar

Abstract: In this paper, ellipsoidal core (Si) and shell (SiO₂) metamaterial has been proposed for highly directional properties. At the wavelength of magnetic resonance, Fano dip occurs in the backward scattering cross section and forward scattering enhancement takes place at the same wavelength so that there is an increment in the directivity. Effect on the directivity by changing the length of ellipsoidal nanoparticle along semi-axes has been analyzed. Two Fano resonances have been observed by decreasing the length of the nanoparticle along the semi-axis having electric polarization, where first and second Fano resonances are attributed to the dipole and quadrupole moments, respectively. These Fano resonant wavelengths in ellipsoidal nanoparticle exhibit higher directivity than the Kerker's type scattering or forward scattering shown by symmetrical structures like sphere. So, this core-shell metamaterial can act as an efficient directional nanoantenna.

For details refer to <https://doi.org/10.1016/j.spmi.2018.03.067>

All Dielectric Zero-index Metamaterial for TE/TM Polarization

Nishant Shankhwar, **Yogita Kalra*** and Ravindra Kumar Sinha

Abstract: In this article, a novel design of a dielectric vein type zero-index metamaterial (ZIM) has been proposed, which can be made to operate for any of the two polarisations (transverse electric (TE) or transverse magnetic (TM)) by specifically choosing the geometrical parameters. The zero-index behaviour of the metamaterial is due the linear dispersion and existence of Dirac point at the center of the Brillouin zone. Although, ZIM structures comprising periodic arrays of rods-in-air and holes-in-dielectric have already been proposed, their zero-index property is restricted to TM and TE polarization, respectively. However, the structure proposed in this articles exhibits effectively zero refractive index in the TM as well as the TE mode, and hence, has an upper hand over existing dielectric ZIM structures

For details refer to <https://iopscience.iop.org/journal/2040-8986>

**Corresponding Author*



BIOGRAPHY

DR. ASMITA DAS

Department of Biotechnology

Dr. Asmita Das completed her Ph.D. in Immunology from Jawaharlal Nehru University, New Delhi, India and thereafter did postdoctoral research in the Laboratory of Immunogenetics in National Institute of Allergy and Infectious Diseases (NIAID) at National Institutes of Health (NIH) for 5 years. She is presently Assistant Professor in Delhi Technological University, New Delhi. She has been engaged in extensive research in NK cell development and NK receptor modulation and signalling. Her research focus is on combinatorial immunotherapy for cancer and immunodiagnostics. She is also involved in research in Immunoinformatics and genomics with special thrust on theranostics. Apart from her core area of research, she is also engaged in multiinstitution interdisciplinary research with Mechanical Engineering department of IIT Delhi in the field of Computational Fluid Dynamics in Immune complex diagnostics and with JNU in a project on nanoparticle mediated drug delivery system development.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. R. Sharma and **A. Das**, "IL-2 mediates NK cell proliferation but not hyperactivity", *Immunologic Research*, vol. 66, no. 1, pp. 151-157, 2018, Impact Factor: 2.487.

IL-2 Mediates NK Cell Proliferation but not Hyperactivity

Richa Sharma and **Asmita Das***

Abstract: Natural killer cells play a major role in innate immunity against tumor and virus-infected cells. NK cells express activating and inhibitory receptors to regulate their function. It has been established that modulation in the NK cell receptor profile results in altered function of NK cell against target cells. Here, we study the effect of IL-2 stimulation on NK cell inhibitory receptors Ly49A, Ly49C, and activating receptor Ly49D in C57BL/6 mice. It was observed that there was significant increase in expression of Ly49A but no change in expression of Ly49C and Ly49D on IL-2 stimulation. We further noticed that although IL-2 stimulation increased the NK cell population and expression of activation marker NK1.1 but IL-2 stimulation does not cause hyper-responsiveness in NK cells, as there was no increase in MIP-1 α and IFN- γ production in IL-2 stimulated NK cells as compared to unstimulated controls. These findings provide a framework to understand the effect of IL-2 stimulation on cognate and non-cognate receptor ligand interactions and suggest strategies for immunotherapies in conjunction with IL-2 combinatorial therapies.

For details refer to <https://doi.org/10.1007/s12026-017-8982-3>

*Corresponding Author



BIOGRAPHY

PROF. BANSI DHAR MALHOTRA *Department of Biotechnology*

Prof. B.D. Malhotra received his Ph.D. from the University of Delhi, Delhi in 1980. He has published 308 papers in refereed international journals (Citations>18100, h-index: 72), has filed 12 patents (in India and overseas), and has co-authored text books on ‘Nanomaterials for Biosensors: Fundamentals and Applications’ and ‘Biosensors: Fundamentals and Applications’. He is a recipient of the National Research Development Corporation Award 2005 for invention on ‘Blood Glucose Biochemical Analyzer’ and is a Fellow of the Indian National Science Academy, the National Academy of Sciences, India and Academician of Asia Pacific Academy of Materials (APAM). His current research activities include Nanobiomaterials, Biosensors, Bio-fuel cells, Ordered Molecular Assemblies, Conducting Polymers, Langmuir-Blodgett Films, Self-assembled Monolayers, Nano-Biotechnology, Biomedical Engineering and Biomolecular Electronics.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. S. Augustine, A.G. Joshi, B.K. Yadav, A. Mehta, P. Kumar, V. Renugopalakrishnan and **B.D. Malhotra**, “An emerging nanostructured molybdenum trioxide-based biocompatible sensor platform for breast cancer biomarker detection”, *MRS Communications*, vol. 8, no. 3, pp. 668-679, 2018, Impact Factor: 3.008.

An Emerging Nanostructured Molybdenum Trioxide-Based Biocompatible Sensor Platform for Breast Cancer Biomarker Detection

Shine Augustine, Amish G. Joshi, Birendra Kumar Yadav, Anurag Mehta, Pragati Kumar, Venkatesan Renugopalakrishnan and **Bansi Dhar Malhotra***

Abstract: We report results of the studies relating to the development of the emerging nanostructured molybdenum trioxide (nMoO₃)-based biocompatible label-free biosensing platform for breast cancer detection. The structural and morphological studies of the synthesized nMoO₃ nanorods were investigated by XRD, SEM, X-ray photoelectron spectroscopic, and TEM techniques. This biocompatible one-dimensional (1D) nMoO₃-based biosensing platform exhibited high sensitivity (0.904 μA/mL/ng/cm²), wide linear detection range (2.5–110 ng/mL), and a lower detection limit as 2.47 ng/mL toward human epidermal growth factor receptor-2 detection. The results obtained using this sensor platform on serum samples of breast cancer patients were validated using ELISA.

For details refer to <https://doi.org/10.1557/mrc.2018.182>

*Corresponding Author



BIOGRAPHY

MS. DESHIKA KOHLI

Department of Biotechnology

Ms. Deshika Kohli is a research scholar in Biotechnology Department, Delhi Technological University. Her thesis entitled “Identification of key genes involved in root knot nematode (*M. incognita*) development for effective resistance in plants using RNAi” under the guidance of Dr Navneeta Bharadvaja, DTU and Prof R Srinivasan, Emeritus Scientist, NRCPB. The work involved the utilization and manipulation of reverse genetic approach in establishing a new methodology for managing the pest infection of economically important agriculture crops. The work also envisages identification and characterization of key genes in Plant parasitic nematode (*Meloidogyne incognita*) development. She has knowledge of language R which is very helpful in analyzing and representing the data. She is also aware of Bioinformatics tools for handling high-throughput sequencing data like that of small RNA sequencing and transcriptomic data such as, UEA small RNA workbench, psRNAtarget search and M-fold.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **D. Kohli**, P. Chidambaranathan, J.P.T. Kumar, A.K. Singh, A. Kumar, A. Sirohi, K. Subramaniam, R. Srinivasan, N. Bharadvaja and P.K. Jain, “Host-mediated RNAi of a Notch-like receptor gene in *Meloidogyne incognita* induces nematode resistance”, *Parasitology*, vol. 145, no. 14, pp. 1896-1906, 2018, Impact Factor: 2.511.

Host-mediated RNAi of a Notch-like Receptor Gene in *Meloidogyne Incognita* Induces Nematode Resistance

Deshika Kohli, Paraeswaran Chidambaranathan, J. Prasanth Tej Kumar, Ashish Kumar Singh, Anil Kumar, Anil Sirohi, K. Subramaniam, Ramamurthy Srinivasan, Navneeta Bharadvaja and Pradeep K. Jain

Abstract: GLP-1 (abnormal germline proliferation) is a Notch-like receptor protein that plays an essential role in pharyngeal development. In this study, an orthologue of *Caenorhabditis elegans* glp-1 was identified in *Meloidogyne incognita*. A computational analysis revealed that the orthologue contained almost all the domains present in the *C. elegans* gene: specifically, the LIN-12/Notch repeat, the ankyrin repeat, a transmembrane domain and different ligand-binding motifs were present in orthologue, but the epidermal growth factor-like motif was not observed. An expression analysis showed differential expression of glp-1 throughout the life cycle of *M. incognita*, with relatively higher expression in the egg stage. To evaluate the silencing efficacy of Mi-glp-1, transgenic *Arabidopsis* plants carrying double-stranded RNA constructs of glp-1 were generated, and infection of these plants with *M. incognita* resulted in a 47–50% reduction in the numbers of galls, females and egg masses. Females obtained from the transgenic RNAi lines exhibited 40–60% reductions in the transcript levels of the targeted glp-1 gene compared with females isolated from the control plants. Second-generation juveniles (J2s), which were descendants of the infected females from the transgenic lines, showed aberrant phenotypes. These J2s exhibited a significant decrease in the overall distance from the stylet to the metacarpus region, and this effect was accompanied by disruption around the metacorporeal bulb of the pharynx. The present study suggests a role for this gene in organ (pharynx) development during embryogenesis in *M. incognita* and its potential use as a target in the management of nematode infestations in plants.

For details refer to <https://doi.org/10.1017/S0031182018000641>



BIOGRAPHY

MS. MANSI PUNJABI *Department of Biotechnology*

Ms. Mansi Punjabi is a Ph.D. student at the Department of Biotechnology, Delhi Technological University. Her research focuses on biofortification of crops as a measure to address food security. Her mentioned publication deals with the structural and functional characterization of late phytic acid biosynthesis pathway gene, as a step towards developing low phytic acid nutritionally enhanced transgenic crops. Mansi gained experience and training in developing genetically modified crops while working as a Senior Researcher at the Indian Agricultural Research Institute. She received her Bachelors in Food Technology from the University of Delhi and her Masters in Applied Microbiology and Biotechnology from Banasthali Vidyapith.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **M. Punjabi**, N. Bharadvaja, A. Sachdev and V. Krishnan, "Molecular characterization, modeling, and docking analysis of late phytic acid biosynthesis pathway gene, inositol polyphosphate 6-/3-/5-kinase, a potential candidate for developing low phytate crops", 3 *Biotech*, vol. 8, no. 8, pp. 344, 2018, Impact Factor: 1.497.

Molecular Characterization, Modeling, and Docking Analysis of Late Phytic Acid Biosynthesis Pathway Gene, Inositol Polyphosphate 6-/3-/5-kinase, A Potential Candidate for Developing Low Phytate Crops

Mansi Punjabi, Navneeta Bharadvaja, Archana Sachdev and Veda Krishnan

Abstract: The coding sequence of *inositol polyphosphate 6-/3-/5-kinase (GmIPK2)* gene was identified and cloned from popular Indian soybean cultivar Pusa-16. The clone was predicted to encode 279 amino acids long, 30.97 kDa protein. Multiple sequence alignment revealed an inositol phosphate-binding motif, PxxxDxKxG throughout the IPK2 sequences along with other motifs unique to inositol phosphate kinase superfamily. Eight α -helices and eight β -strands in antiparallel β -sheets arrangement were predicted in the secondary structure of GmIPK2. The temporal analysis of *GmIPK2* revealed maximum expression in the seed tissues during later stages of development while spatially the transcript levels were lowest in leaf and stem tissues. Endosperm-specific cis-regulatory motifs (GCN4 and Skn_1) which support high levels of expression, as observed in the developing seeds, were detected in its promoter region. The protein structure of GmIPK2 was modeled based on the crystal structure of inositol polyphosphate multikinase from *Arabidopsis thaliana* (PDB:4FRF) and subsequently docked with inositol phosphate ligands (PDB: 5GUG-I3P and PDB: 4A69-I0P). Molecular dynamics (MD) simulation established the structural stability of both, modeled enzyme and ligand-bound complexes. Docking in combination with trajectory analysis for 50 ns MD run confirmed the participation of Lys105, Lys126 and Arg153 residues in the formation of a network of hydrogen bonds to stabilize the ligand-receptor interaction. Results of the present study thus provide valuable information on structural and functional aspects of *GmIPK2* which shall assist in strategizing our long-term goal of achieving phytic acid reduction in soybean by genetic modification of its biosynthetic pathway to develop a nutritionally enhanced crop in the future.

For details refer to <https://doi.org/10.1007/s13205-018-1343-7>



BIOGRAPHY

DR. NAVNEETA BHARADVAJA

Department of Biotechnology

Dr. Navneeta Bharadvaja is working as Assistant Professor, in the Department of Biotechnology, Delhi Technological University since 2010. Her research area is Plant Biotechnology and Phytoremediation. Her group is engaged in enhancing pharmaceutically important compounds in cultures, selection of elite accessions for high yield of Secondary Metabolites of industrial importance etc.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. A. Roy and **N. Bharadvaja**, "Effect of various culture condition on shoot multiplication and GC-MS analysis of *Plumbago zeylanica* accessions for plumbagin production", *Acta Physiologiae Plantarum*, vol. 40, no. 11, pp. 190, 2018, Impact Factor: 1.438.

Effect of Various Culture Condition on Shoot Multiplication and GC-MS Analysis of *Plumbago Zeylanica* Accessions for Plumbagin Production

Arpita Roy and Navneeta Bharadvaja*

Abstract: *Plumbago zeylanica*, a pharmaceutically important medicinal plant, contains a wide range of phytochemicals. Culture parameters like carbon source, nitrogen source, and culture media are essential for the development and growth of explants. In this investigation, the influence of various carbon sources (sucrose, glucose, and fructose at 3% concentration), nitrogen source (ammonium nitrate, sodium nitrate, and potassium nitrate) and plant tissue culture media (MS medium, Gamborg's B5 medium, White medium and Nitsch medium) on shoot multiplication of five different accessions was studied. Optimum growth of all five accessions was observed in MS media containing 3% sucrose and ammonium nitrate as a source of carbon and nitrogen. Out of five accessions, IC-524441 showed the highest shoot multiplication. Further, methanolic extracts of all accessions (grown in MS media containing 3% sucrose and ammonium nitrate as nitrogen source) were prepared and comparison of extracts in DPPH assay indicated that accession number IC-524441 was the most effective free radical scavenging agent. Total phenolic, flavonoid and tannin content ranges were from 20 to 70 µg/ml, 40 to 100 µg/ml and 55 to 120 µg/ml, respectively, and the highest amount was found in accession number IC-524441. Sucrose and ammonium nitrate content may be responsible for increased antioxidant activity, flavonoids content, phenolic content, and tannin content in accession number IC-524441. GC-MS of ethyl acetate extract of all five accessions of *P. zeylanica* was conducted (grown in MS media containing 3% sucrose and ammonium nitrate as nitrogen source). GC-MS analysis of the aerial part showed the presence of various phytochemicals, which include 1,4-naphthalenedione, 3-eicosene, 5-eicosene, phthalic acid, *o*-anisic acid, thiocetic acid, 1-octadecene, 5-*t*-butyl-cycloheptene, 2-benzoyl-1,2-dihydro-1-isoquinolinecarbonitrile, octadecanal, silane, 3-methoxy-2-methyl-2-(1-phenyl-ethylamino)-propionic acid, and 1-nonadecene. Accession number IC-524441 contains the highest amount of plumbagin, i.e. 14.19 ± 0.5 µg/ml as compared to the others.

For details refer to <https://doi.org/10.1007/s11738-018-2766-9>

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BIOGRAPHY

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Department of Biotechnology

Dr. Yasha Hasija (B.Tech., M.Tech., and Ph.D.) is currently working as Associate Professor at Department of Biotechnology, Delhi Technological University. She has published 61 papers in national and international journals and conferences, and 6 book chapters. Dr Hasija has been awarded several prestigious awards, including the Department of Science and Technology Award for attending the meeting of Nobel Laureates and Students in Lindau in 2002; & Human Gene Nomenclature Award at the Human Genome Meeting-2010 held at Montpellier, France. She is the Project Investigator of several sponsored research projects from Govt. agencies including DST-SERB, DBT and CSIR-OSDD. She is an active researcher supervising B.Tech., M.Tech. and Ph.D. students at DTU. Her broad areas of research include genome informatics, genome annotation, microbial informatics, integration of genome-scale data for systems biology and personalized genomics.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. R. Virmani, Y. Singh and **Y. Hasija**, “GroEL mediates folding of *Bacillus anthracis* Serine/Threonine protein kinase, PrkC”, *Indian Journal of Microbiology*, vol. 58, no. 4, pp. 520-524, 2018, Impact Factor: 1.310.
2. R. Virmani, **Y. Hasija** and Y. Singh, “Effect of homocysteine on biofilm formation by Mycobacteria”, *Indian Journal of Microbiology*, vol. 58, no. 3, pp. 287-293, 2018, Impact Factor: 1.310.
3. R. Chakraborty, H. Gupta, R. Rahman and **Y. Hasija**, “*In Silico* analysis of nsSNPs in ABCB1 gene affecting breast cancer associated protein P-glycoprotein (P-gp)”, *Computational Biology and Chemistry*, vol. 77, pp. 430-441, 2018, Impact Factor: 1.331.

GroEL Mediates Golding of Bacillus Anthracis Serine/Threonine Protein Kinase, PrkC

Richa Virmani, Yogendra Singh and Yasha Hasija*

Abstract: *Bacillus anthracis* causes anthrax in human and animals. Both, signaling system such as two component system and endogenous chaperone system such as GroEL-GroES help bacteria to cope with the environmental challenges. Such molecular chaperones are the stress induced proteins that help bacteria to override unfavorable conditions by their moonlighting functions. Previous reports showed that PrkC and PrpC, the Ser/Thr kinase-phosphatase pair in *B. anthracis*, control phosphorylation of GroEL and regulate biofilm formation. In this study, we show that GroEL is involved in the folding of PrkC to active form. The proteins (GroEL, PrkC and PrpC) were expressed and purified by affinity chromatography. Purified GroEL was used for refolding of denatured PrkC and PrpC and observed that GroEL refolds PrkC but not PrpC as measured by their enzymatic activity. We also observed that purification of GroEL with six histidine tag using Cobalt-Agarose resin yielded superior quality GroEL protein with negligible contamination of non-specific proteins. Thus, cobalt resin can be a better choice for purification of many histidine tagged proteins, where Ni-NTA does not work very well.

For details refer to <https://doi.org/10.1007/s12088-018-0744-y>

Effect of Homocysteine on Biofilm Formation by Mycobacteria

Richa Virmani, Yasha Hasija* and Yogendra Singh

Abstract: Mycobacteria show peculiar aggregated outgrowth like biofilm on the surface of solid or liquid media. Biofilms harbor antibiotic resistant bacteria in a self-produced extracellular matrix that signifies the bacterial fate to sedentary existence. Despite years of research, very little is known about the mechanisms that contribute to biofilm formation. LuxS has been previously known to play a role in biofilm formation in Autoinducer-2 dependent manner. We here show the effect of LuxS product-homocysteine, on the biofilm forming ability of non-tuberculous mycobacteria, *Mycobacterium smegmatis* and *Mycobacterium bovis* BCG showing AI-2 independent phenotypic effect of LuxS. Exogenous supplementation of homocysteine in the culture media leads to aberrant cording, pellicle outgrowth, and biofilm formation. Thus, our study contributes to the better understanding of the mechanism of mycobacterial biofilm formation and sheds light on the role of LuxS product homocysteine. In addition, we highlight the contribution of activated methyl cycle in bacterial quorum sensing.

For details refer to <https://doi.org/10.1007/s12088-018-0739-8>

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In Silico Analysis of nsSNPs in ABCB1 Gene Affecting Breast Cancer Associated Protein P-glycoprotein (P-gp)

Rajkumar Chakraborty, Himani Gupta, Razia Rahman and Yasha Hasija*

Abstract: Breast cancer is one of the most common cancers among women and increased expression of some polymorphic genes, which is rare within families, enhances the risk of breast cancer incidence. The correct identification of the functional SNPs of such genes is important for characterizing the functional aspect of these SNPs which can be assessed by evaluating their significant influence on the structure and function of proteins. Since the presence of SNPs in these genes affects the quality of life of a breast cancer patient, thus, the associated diagnostic markers have a reliable potential for assessing the prognosis of breast cancer. ATP-binding cassette (ABC) genes have been shown to obstruct the treatment of breast cancer by providing resistance to malignant cells from anti-cancer drugs. Some allelic variants of ABCG2 and ABCB1 are also associated with occurrence of skin toxicity during the treatment of breast cancer with anti-cancer drugs. The present study has incorporated comprehensive bioinformatics analysis to explore the possible disease-associated mutations of ABCB1 gene, a gene that resulted from gene-environment interaction study, and understand their consequential effect on the structural and functional behavior of P-glycoprotein. Two gene variants (R538S and M701R) of P-glycoprotein were selected as potentially detrimental point mutations, and these variants were modeled. Molecular dynamic simulation (MDS) studies unraveled the atomic interactions and motion trajectories of the native as well as the two mutant (R538S and M701R) structures and were predicted to have a deleterious effect on breast cancer associated P-gp. Thus, the present study may broaden the way to design novel potent drugs for overcoming the problems associated with multidrug resistance (MDR) resulting from a change in protein conformation due to a mutation in ABCB1 gene.

For details refer to <https://doi.org/10.1016/j.compbiolchem.2018.08.004>

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BIOGRAPHY

PROF. AMIT KUMAR SHRIVASTAVA *Department of Civil Engineering*

Prof. Amit Kumar Shrivastava, B.E., M.E., Ph.D. (IIT Delhi), LMIGS, LMISRMTT, MISMGE, has more than 23 years of hand on experience. He is currently working as Department of Civil Engineering, Delhi Technological University, Delhi. His areas of interests include geotechnical engineering, strength and deformation behavior of rocks and rock masses, pavement engineering and modern construction practices. He has supervised 1 Ph.D. thesis, 25 M.E. thesis, 30 B.E project and currently 5 Ph.D. Research scholars are working under his supervision. He has published more than 50 research publications at national and international level journal and conferences. He has qualified GATE -1996 AIR - 162, IES- 2002 AIR -33 and BPSC-1999 AIR- 49. He is in the panel of reviewer for many international journals. He received First Prize in the State Level (MS) Technical Paper Competition-1997, appreciation letter from UNESCO -2010 and is the recipient of Biennial IGS-H.C. Verma Diamond Jubilee award for Innovative Instrument Design for the year 2010-2011.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A.K. Shrivastava** and K.S. Rao, "Physical modeling of shear behavior of infilled rock joints under CNL and CNS boundary conditions", *Rock Mechanics and Rock Engineering*, vol. 51, no. 1, pp. 101-118, 2018, Impact Factor: 2.819.

Physical Modeling of Shear Behavior of Infilled Rock Joints Under CNL and CNS Boundary Conditions

Amit Kumar Shrivastava and K. Seshagiri Rao

Abstract: Despite their frequent natural occurrence, filled discontinuities under constant normal stiffness (CNS) boundary conditions have been studied much less systematically, perhaps because of the difficulties arising from the increased number of variable parameters. Because of the lack of reliable and realistic theoretical or empirical relations and the difficulties in obtaining and testing representative samples, engineers rely on judgment and often consider the shear strength of the infilled material itself as shear strength of rock joints. This assumption leads to uneconomical and also sometimes the unsafe design of underground structures, slopes, rock-socketed piles and foundations. To study the effect of infill on the shear behavior of rock joints, tests were performed on the modeled infilled rock joint having different joint roughness under constant normal load (CNL) and CNS boundary conditions at various initial normal stress and varying thickness of the infilled material. The test results indicate that shear strength decreases with an increase in t/a ratio for both CNL and CNS conditions, but the reduction in shear strength is more for CNL than for CNS condition for a given initial normal stress. The detailed account of the effect of thickness of infilled material on shear and deformation behavior of infilled rock joint is discussed in this paper, and a model is proposed to predict shear strength of infilled rock joint.

For details refer to <https://doi.org/10.1007/s00603-017-1318-8>



BIOGRAPHY

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Department of Computer Science & Engineering

Dr. Akshi Kumar is an Assistant Professor in the Department of Computer Science & Engineering at Delhi Technological University (formerly Delhi College of Engineering). She has been with the university for more than 10 years and was selected through UPSC, India for the post. She has received her Ph.D. in Computer Engineering from Faculty of Technology, University of Delhi, India in 2011. She completed her Master of Technology with honours in Computer Science & Engineering from Guru Gobind Singh Indraprastha University, India in 2005. She received her Bachelor of Engineering degree with distinction in Computer Science & Engineering from Maharshi Dayanand University, India in 2003. She has presented several papers in peer-reviewed international conferences and published work in science cited journals. Dr. Kumar's research interests are in the area of intelligent systems, social media analytics and soft computing.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A. Kumar**, H. Ahuja, N.K. Singh, D. Gupta, A. Khanna and J.J. Rodrigues, "Supported matrix factorization using distributed representations for personalised recommendations on twitter", *Computers & Electrical Engineering*, vol. 71, pp. 569-577, 2018, Impact Factor: 1.747.

Supported Matrix Factorization using Distributed Representations for Personalised Recommendations on Twitter

Akshi Kumar, Himanshu Ahuja, Nikhil Kumar Singh, Deepak Gupta, Ashish Khanna and Joel J.P.C. Rodrigues

Abstract: Microblogging is one of the most prevalent media for sharing news on the Internet. Microblogging platforms, such as Twitter have proven to be of great success in targeted marketing, alerting about natural disasters and promoting government policies among others; But most of this relevant information in microblogs is side-lined, owing to information overload, rendering any practical utility of the platform as ineffective. Hence, it is crucial to filter data and recommend only relevant information to the users. Interestingly, to pertain and appeal to a certain community, users make the use of *hashtags* (#), which in turn, helps in the efficient categorization and summarization of microblogs. In this paper, we exploit this advantage through a novel framework for a recommendation system, Distributed Representation based Supported Matrix Factorization (DRSMF) build on top of Probabilistic Matrix Factorization (PMF) and Recurrent Neural Networks (RNNs). The RNNs generate character-level distributed representations for each tweet to overcome the solecistic use of sentence structure in microblogs. The framework further performs a multi-modal analysis on the microblog posts to recommend similar users and *hashtags*, which assists in countering information-overload. Our framework outperforms standard PMF techniques by the use of constrained regularisation on latent factor representations.

For details refer to <https://doi.org/10.1016/j.compeleceng.2018.08.007>



BIOGRAPHY

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Department of Computer Science & Engineering

Ms. Divyashikha Sethia is an Assistant Professor in Department of Computer Science and Engineering. She is an alumni of IIT Delhi. Her research interests include distributed systems, mobile computing, healthcare and security. Prior to moving in academics she has worked in the software industry in Telecom and Networking area in software and test automation development in leading companies like Cisco System in US and India for more than 5 years. She has more than 15 years of experience in research and academics. She has been actively working in secure mobile-based healthcare technologies. Her research has focused to improve telehealthcare quality for management of dispersed health records using mobile devices. More recently her research group has been working on a brain-computer interface using mobile devices to look into the area of mental healthcare and use of ICT for lifestyle changes. She has published patent, and research papers in esteemed journals and conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **D. Sethia**, D. Gupta and H. Saran, "NFC secure element-based mutual authentication and attestation for IoT access", *IEEE Transaction of Consumer Electronics*, vol. 64, no. 8, pp. 470-479, 2018, Impact Factor: 1.802.

NFC Secure Element-Based Mutual Authentication and Attestation for IoT Access

Divyashikha Sethia, Daya Gupta and Huzur Saran

Abstract: Certain resourceful and powered Internet of Things (IoT) can become victims to launch cyber attacks. Near field communication (NFC) can be used for their secure on-demand access. In this paper, we present a novel framework for the NFC secure element (SE)-based mutual authentication and attestation for IoT access with a user device such as a mobile device using NFC-based Host Card Emulation (HCE) mode for the first time. HCE is robust as compared to the other NFC modes. A cloud-based Trusted Certified Authority (TCA) manages all cryptographic credentials and stores them in the tamper-resistant SE and Trusted Platform Module (TPM)-based attestation modules on the devices. It uses a newly proposed NFC SE-based mutual authentication and attestation (NSE-AA) protocol for proof-of-locality, end-to-end anonymous mutual authentication between the SEs and an associated remote attestation for trust. The protocol is robust and lightweight as compared to the existing schemes. We provide its informal and formal security analysis using the Real-Or-Random (ROR) model. A simulation on the Automated Validation of Internet Security Protocols and Applications (AVISPA) tool proves its safety. We also briefly present the details of a prototype with a commercial mid-range priced mobile device and Single Board Computer (SBC)-based IoT device.

For details refer to <https://doi.org/10.1109/TCE.2018.2873181>

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BIOGRAPHY

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Dr. Rahul Katarya is working as an Associate Professor in the Department of Computer Science & Engineering, Delhi Technological University, New Delhi, India. He is the Officer-in-charge of Big Data Analytics (BDA) Laboratory and Data Base Management (DBMS) Laboratory. His research interests are Big Data Analytics, Data Science, Web Mining, Social Networks, Recommender Systems, Machine Learning, Software Engineering, Software Quality & Testing, Online Human Behaviour Analysis amongst others. He is a valued member of the Institute of Electrical and Electronics Engineers (IEEE) and Life member of Computer Society of India (SCI). He is a reviewer of various IEEE Transactions, Elsevier and Springer journals. He has published various research articles in Science Citation Index (SCI) indexed premier international journals and in IEEE international conferences. On 21st August 2018, he organized an international seminar on “Recent Trends in Big Data Analytics” in collaboration with various New Zealand universities: Auckland University of Technology, the University of Waikato and University of Auckland. In March 2018, Delhi Technological University awarded him for “Commendable Research Award- 2018” for excellence in research for the year 2017.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. **R. Katarya**, “Movie recommender system with metaheuristic artificial bee”, *Neural Computing and Applications*, vol. 30, no. 6, pp. 1983-1990, 2018, Impact Factor: 4.213.
2. **R. Katarya** and O.P. Verma, “Efficient music recommender system using context graph and particle swarm”, *Multimedia Tools and Applications*, vol. 77, no. 2, pp. 2673-2687, 2018, Impact Factor: 1.541.
3. **R. Katarya** and O.P. Verma, “Recommender system with grey wolf optimizer and FCM” *Neural Computing and Applications*, vol. 30, no. 5, pp. 1679–1687, 2018, Impact Factor: 4.213.

Movie Recommender System with Metaheuristic Artificial Bee

Rahul Katarya

Abstract: Recommender systems are information retrieval tool that allocates accurate recommendations to the specific users. Collaborative movie recommender systems support users in accessing their popular movies by suggesting similar users or movies from their past common ratings. In this research work, a hybrid recommender system has been proposed which utilized k-means clustering algorithm with bio-inspired artificial bee colony (ABC) optimization technique and applied to the Movielens dataset. Our proposed system has been described systematic manner, and the subsequent results have been demonstrated. The proposed system (ABC-KM) is also compared with existing approaches, and the consequences have been examined. Estimation procedures such as precision, mean absolute error, recall, and accuracy for the movie recommender system delivered improved results for ABC-KM collaborative movie recommender system. The experiment outcomes on Movielens dataset established that the projected system provides immense achievement regarding scalability, performance and delivers accurate personalized movie recommendations by reducing cold start problem. As far as our best research knowledge, our proposed recommender system is novel and delivers effective fallouts when compared with already existing systems.

For details refer to <https://doi.org/10.1007/s00521-017-3338-4>

Efficient Music Recommender System using Context Graph and Particle Swarm

Rahul Katarya and Om Prakash Verma

Abstract: Music recommender systems is an important field of research because of easy availability and use of online music. The most existing models only focus on explicit data like ratings and other user-item dimensions. A challenging problem in music recommendation is to model a variety of contextual information, such as feedback, time and location. In this article, we proposed a competent hybrid music recommender system (HMRS), which works on context and collaborative approaches. The timestamp is extracted from users listening log to construct a decision context behavior that extracted various temporal features like a week, sessions(as morning, evening or night). We used depth-first-search (DFS) algorithm which traverses the whole graph through the paths in different contexts. Bellman-Ford algorithm provides ranked list of recommended items with multi-layer context graph. We enhanced the process using particle swarm optimization (PSO) which produced highly optimized results. The dataset is used from Last.fm which contains 19,150,868 music listening logs of 992 users (till May, 4th 2009). We extract the properties of music from user's listening history and evaluate the efficient system to recommend music based on user's contextual preferences. Our system noticeably delivers the best recommendations regarding recall results when compared to existing methods.

For details refer to <https://doi.org/10.1007/s11042-017-4447-x>

Recommender System with Grey Wolf Optimizer and FCM

Rahul Katarya and Om Prakash Verma

Abstract: Recommender systems are contributing a significant aspect in information filtering and knowledge management systems. They provide explicit and reliable recommendations to the users so that user can get information about all products in e-commerce domain. In the era of big data and large complex information delivery system, it is impossible to get the right information in the online environment. In this research work, we offered a novel movie-based collaborative recommender system which utilizes the bio-inspired gray wolf optimizer algorithm and fuzzy c-mean (FCM) clustering technique and predicts rating of a movie for a particular user based on his historical data and similarity of users. Gray wolf optimizer algorithm was applied on the Movielens dataset to obtain the initial clusters, and also the initial positions of clusters are obtained. FCM is used to classify the users in the dataset by similarity of user ratings. Our proposed collaborative recommender system performed extremely well with respect to accuracy and precision. We analyzed our proposed recommender system over Movielens dataset which is available publically. Various evaluation metrics were utilized such as mean absolute error, standard deviation, precision and recall. We also compared the performance of projected system with already established systems. The experiment results delivered by proposed recommender system demonstrated that efficiency and performance are enhanced and also offered better recommendations when compared with our previous work.

For details refer to <https://doi.org/10.1007/s00521-016-2817-3>



BIOGRAPHY

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Department of Computer Science & Engineering

Dr. Ruchika Malhotra is Associate Head and Associate Professor in the Discipline of Software Engineering, Department of Computer Science & Engineering, Delhi Technological University, Delhi, India. She is Associate Dean in Industrial Research and Development, Delhi Technological University. She was awarded with prestigious Raman Fellowship for pursuing Post doctoral research in Indiana University Purdue University Indianapolis USA. She received her master's and doctorate degree in software engineering from the University School of Information Technology, Guru Gobind Singh Indraprastha University, Delhi, India. She has received IBM Faculty Award 2013. She is recipient of Commendable Research Award (2018) by Delhi Technological University. Her h-index is 26 as reported by Google Scholar. She is author of book titled "Empirical Research in Software Engineering" published by CRC press and co-author of a book on Object Oriented Software Engineering published by PHI Learning. She has published more than 160 research papers in international journals and conferences. Her research interests are in software testing, improving software quality, statistical and adaptive prediction models, software metrics and the definition and validation of software metrics. She has supervised 5 Ph.D. scholars.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **R. Malhotra**, "An extensive analysis of search-based techniques for predicting defective classes", *Computers & Electrical Engineering*, vol. 71, pp. 611-626, 2018, Impact Factor: 1.747.
2. **R. Malhotra** and M. Khanna, "Particle swarm optimization-based ensemble learning for software change prediction", *Information and Software Technology*, vol. 102, pp. 65-84, 2018, Impact Factor: 2.627.

An Extensive Analysis of Search-Based Techniques for Predicting Defective Classes

Ruchika Malhotra

Abstract: In spite of constant planning, effective documentation and proper implementation of a software during its life cycle, many defects still occur. Various empirical studies have found that prediction models developed using software metrics can be used to predict these defects. Researchers have advocated the use of search-based techniques and their hybridized versions in literature for developing software quality prediction models. This study conducts an extensive comparison of 20 search-based techniques, 16 hybridized techniques and 17 machine-learning techniques amongst each other, to develop software defect prediction models using 17 data sets. The comparison framework used in the study is efficient as it (i) deals with the stochastic nature of the techniques (ii) provides a fair comparison amongst the techniques (iii) promotes repeatability of the study and (iv) statistically validates the results. The results of the study indicate promising ability of search-based techniques and their hybridized versions for predicting defective classes.

For details refer to <https://doi.org/10.1016/j.compeleceng.2018.08.017>

Particle Swarm Optimization-Based Ensemble Learning for Software Change Prediction

Ruchika Malhotra and Megha Khanna

Abstract: Various researchers have successfully established the association between Object-Oriented metrics and change prone nature of a class. However, they actively continue to explore effective classifiers for developing efficient change prediction models. Recent developments have ascertained that ensemble methodology can be used to improve the prediction performance of individual classifiers. This study proposes four strategies of ensemble learning to predict change prone classes by combining seven individual Particle Swarm Optimization (PSO) based classifiers as constituents of ensembles and aggregating them using weighted voting. The weights allocated to individual classifiers are based on their accuracy and their ability to correctly predict “hard instances” i.e. classes which are frequently misclassified by a majority of classifiers. Each individual PSO based classifier uses a different fitness function. The ensembles are constructed on the premises that change in fitness functions leads to variation in the results of a search-based algorithm such as PSO. Therefore, it is important to combine them to obtain a better classifier with improved accuracy using the ensemble methodology. The proposed strategies of ensemble learning were found effective in predicting software change. The statistical analysis of the results indicates improved performance of the proposed ensemble classifiers as compared to individual classifiers. Furthermore, the results of the proposed voting ensemble classifiers were found competent with those of machine-learning ensemble classifiers for determination of change prone classes. The accuracy and diversity of the individual classifiers were instrumental in the superior performance of the proposed voting ensemble classifiers.

For details refer to <https://doi.org/10.1016/j.infsof.2018.05.007>



BIOGRAPHY

MR. AJAY KUMAR

Department of Electrical Engineering

Mr. Ajay Kumar is currently pursuing his Ph.D. degree in Electrical Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering), New Delhi, India. He is working in Microelectronics Research Lab, Applied Physics Department, Delhi Technological University. He has recently joined Jaypee Institute of Information Technology (JIIT), Noida as Assistant Professor in Electronics and Communication Engineering Department. He received the B.Tech. degree in Electronics and Communication from UPTU, Lucknow, India in 2009 and M.Tech. degree in Nanoscience and Technology from Delhi Technological University, Delhi, India in 2014. He has authored or co-authored over 50 papers in various international and national journals and conferences. His research area is modelling and simulation of sub-30 nm recessed channel MOSFET for high performance applications. He received commendable research excellence award in 2018 by DTU. Ajay Kumar is the member of IEEE, OSA and other professional societies. He is also a reviewer of IEEE Transactions on Electron Devices.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A. Kumar**, S. Singh, B. Tiwari, M.M. Tripathi and R. Chaujar, "Radiation analysis of N-channel TGRC-MOSFET: An X-Ray dosimeter", *IEEE Transactions on Electron Devices*, vol. 99, pp. 1-7, 2018, Impact Factor: 2.62.

Radiation Analysis of N-channel TGRC-MOSFET: An X-ray Dosimeter

Ajay Kumar, Samarth Singh, Balak Tiwari, M.M. Tripathi and Rishu Chaujar

Abstract: This paper reports the response of an N-channel transparent gate recessed channel (TGRC) metal-oxide-semiconductor field-effect transistor (MOSFET) to X-ray radiation in the 0.5-k-10-krad dose range after irradiation. TCAD simulations for the same have been done to estimate the threshold voltage shift in MOSFET with different radiation dosages. Models accounting for electron-hole pair generation and recombination are applied along with the trap/detrapped model for an insulator as well as interface charging. An improvement of 1.11 mV/krad in radiation sensitivity has been found in increasing the oxide thickness from 2 to 6 nm. The results suggest that TGRC-MOSFET can be effectively used as an X-ray dosimeter in the sub-30-nm scale. Along with a signal amplification and processing circuit, this device can find an enormous applicability in clinical and space environments.

For details refer to <https://doi.org/10.1109/TED.2018.2869536>



BIOGRAPHY

PROF. ALKA SINGH

Department of Electrical Engineering

Prof. Alka Singh received the B.E. degree in Electrical Engineering from Delhi College of Engineering, Delhi, India, in 1996, the M. Tech. Degree in Technology in Power systems from the Indian Institute of Technology, New Delhi, India, in 2001, and the Ph.D. degree from Netaji Subash Institute of Technology (Delhi University), Delhi, India, in 2006. She has teaching, industry and research experience of more than twenty years. She is a Senior member of IEEE and Executive Committee member of IEEE PES-IAS Delhi Chapter. She is currently a Professor in the Department of Electrical Engineering, Delhi Technological University, Delhi. Her research interests include power systems, power quality and applications of power electronics to power systems.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. M. Badoni, **A. Singh**, V.P. Singh and R.N. Tripathi, "Grid interfaced solar photovoltaic system using ZA-LMS based control algorithm", *Electric Power Systems Research*, vol. 160, pp. 261-272, 2018, Impact Factor: 2.856.

Grid Interfaced Solar Photovoltaic System using ZA-LMS based Control Algorithm

Manoj Badoni, **Alka Singh***, Vijay P. Singh and Ravi Nath Tripathi

Abstract: Renewable energy sources such as solar photovoltaic can meet increasing energy demand in countries where there is sufficient availability of sun light. Intermittent nature of this kind of renewable energy sources demands a control which can handle fast dynamics of the system. This paper presents a grid coupled solar photovoltaic (SPV) system which includes solar photovoltaic array, incremental conductance based MPPT and boost converter. Grid integration of SPV array is performed using three phase voltage source converter (VSC) controlled with a fast and robust control algorithm. A Zero Attracting Least Mean Square (ZA-LMS) based controller is proposed to generate reference grid currents. These currents are compared along with sensed grid currents to generate switching pulses for three phase VSC. The proposed system is used to feed real power demand of load along with power quality refinement features such as suppression of harmonics, maintaining grid current at unity power factor and balancing of loads. Performance of the ZA-LMS controller is compared with conventional controllers such as normalized least mean square (NLMS) and dq0 frame theory. These controllers are compared for various characteristics concerning weight convergence, mathematical complexity, computational burden on real time controller and harmonic compensation. Proposed controller is implemented using dSPACE 1104 and tested on developed laboratory prototype of grid connected VSC working as shunt active power filter. Performance of the controller is observed and verified for steady state and dynamic load conditions.

For details refer to <https://doi.org/10.1016/j.epsr.2018.03.001>

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Performance Enhancement of Single-Phase Grid-connected PV System under Partial Shading using Cascaded Multilevel Converter

Amritesh Kumar and Vishal Verma

Abstract: Conventional photovoltaic (PV) single/double stage grid - tie centralized and string inverters suffers from the problem of lower efficiency, high filter size, and limited depth of operation for remaining in connection with the grid, particularly under the lower insolation/partial shading condition. This paper proposes a staggered PV connection through cascaded multilevel converter (CMC) for PV-grid tie application utilizing independent maximum power point tracking controller, providing the larger depth of operation under partial shading condition with smaller filter size and electromagnetic interference (EMI). For dynamic and steady-state performance evaluation, a d-q frame-based control algorithm is investigated for the single-phase PV-CMC system. Furthermore, to establish the stability of the proposed controller, a detailed plant model is also investigated along with the detailed comparative analysis for operation of PV under partial shading condition for a conventional PV based centralized and string inverter vis-à-vis proposed PV-CMC approach. The improved performance analysis is demonstrated both through simulation and experimentation.

For details refer to [https://doi.org/ 10.1109/TIA.2017.2789238](https://doi.org/10.1109/TIA.2017.2789238)



BIOGRAPHY

MR. ASHUTOSH TRIVEDI
Department of Electrical Engineering

Mr. Ashutosh Trivedi is a research scholar in Electrical Engineering Department, Delhi Technological University. He is having Master's degree in power system and more than 2 years of industrial experience. He has published six papers in international journals and conferences till now.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **A. Trivedi** and M. Singh, "L₁ adaptive droop control for AC microgrid with small mesh network", *IEEE Transactions on Industrial Electronics*, vol. 65, no. 6, pp. 4781-4789, 2018, Impact Factor: 7.05.

L_1 Adaptive Droop Control for AC Microgrid with Small Mesh Network

Ashutosh Trivedi and Mukhtiar Singh

Abstract: The proposed paper is mainly focused on achieving stable operation of microgrid having reconfigurable architecture leading to huge variation in network parameters. The variation in network parameters may not be easily handled by conventional droop controllers, which are mainly designed while assuming fixed network configuration. However, these assumptions become invalid for a microgrid having small mesh network with reconfigurable structure. Therefore, it is most important for a microgrid to remain stable not only during various changes in droop characteristics but also during dynamic topological changes. The L_1 controllers are well known for their robustness under wide parametric variations. Therefore, a novel L_1 adaptive controller has been designed to achieve enhanced stability of microgrid under the varying network configuration and variable droop controller characteristics. The proposed method is simulated in MATLAB/Simulink and verified on field programmable gate array (FPGA)-based real world hardware platform.

For details refer to <https://doi.org/10.1109/TIE.2017.2772211>



BIOGRAPHY

MR. IMRAN AHMAD QUADRI *Department of Electrical Engineering*

Mr. Imran Ahmad Quadri is pursuing Ph.D. in Electrical Engineering from Delhi Technological University, India. He received B.Tech. from Aligarh Muslim University, Aligarh in 2007 and M.Tech from Jamia Millia Islamia, Delhi in 2012. He has more than six years of teaching and industrial experience. He has several research publications in international reputed journals and conferences. His areas of interest are power system analysis, distributed generation technologies and artificial intelligence.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **I. A. Quadri**, S. Bhowmick and D. Joshi, "A comprehensive technique for optimal allocation of distributed energy resources in radial distribution systems", *Applied Energy*, vol. 211, pp.1245-1260, 2018, Impact Factor: 7.900.
2. **I. A. Quadri**, S. Bhowmick and D. Joshi, "Multi-objective approach to maximise loadability of distribution networks by simultaneous reconfiguration and allocation of distributed energy resources," *IET Generation Transmission & Distribution*, vol. 12, no. 21, pp. 5700-5712, 2018, Impact Factor: 2.618.

A Comprehensive Technique for Optimal Allocation of Distributed Energy Resources in Radial Distribution Systems

Imran Ahmad Quadri, Suman Bhowmick and Dheeraj Joshi

Abstract: Distributed generation (DG) is a better alternative to meet power demand near the load centers than centralized power generation. Optimal placement and sizing of DGs plays a crucial role in improving the performance of distribution systems in terms of network loss reduction, voltage profile improvement, reliability of power supply and stability issues. This paper presents a comprehensive teaching learning-based optimization (CTLBO) technique for the optimal allocation of DGs in radial distribution systems to improve network loss reduction, voltage profile and annual energy savings. The proposed technique can handle mixed integer variables, is parameter independent and possesses immunity to local extrema trappings. The effectiveness of the proposed method is first validated on standard mathematical benchmark functions. It is observed to have better convergence characteristics than teaching learning-based optimization (TLBO) and quasi-oppositional teaching learning-based optimization (QOTLBO). Subsequently, it is applied to optimal DG allocation in IEEE 33-bus, 69-bus and 118-bus radial distribution test systems. Both single and multi-objective formulations are considered. In addition, the selection of the optimal number of DGs in the distribution networks is also investigated and case studies are carried out. Results demonstrate that optimal allocation of DGs using the proposed technique results in marked improvement in the performance of distribution systems over TLBO and QOTLBO. The applicability of the proposed technique for DG allocation in distribution systems with practical load profiles results in further improvement in annual energy loss reduction and cost savings.

For details refer to <https://doi.org/10.1016/j.apenergy.2017.11.108>

Multi-objective Approach to Maximize Loadability of Distribution Networks by Simultaneous Reconfiguration and Allocation of Distributed Energy Resources

Imran Ahmad Quadri, Suman Bhowmick and Dheeraj Joshi

Abstract: In recent years, continuously increasing load demand and deficiency of capital resources vis-à-vis a competitive electricity market have forced transmission and distribution utilities worldwide to maximize the efficiency and utilization of their existing infrastructure. This paper presents a multi-objective approach to maximize the loadability of distribution networks by simultaneous reconfiguration and optimal allocation of distributed energy resources using a comprehensive teaching learning based optimization algorithm. The proposed technique is based on the ϵ -constraints method and uses a graphical approach for network reconfiguration. Loadability enhancement is validated on the IEEE 33-bus and 69-bus radial distribution systems. Several case studies are carried out to demonstrate the effectiveness of the proposed approach in reducing the network active power losses, improving the kVA loading margins and enhancing the voltage profiles while considering voltage and thermal limit constraints. Results show that maximum loadability is obtained with simultaneous network reconfiguration and multiple DER allocation with varying power factors.

For details refer to <http://dx.doi.org/10.1049/iet-gtd.2018.5618>



BIOGRAPHY

PROF. MUKHTIAR SINGH

Department of Electrical Engineering

Prof. Mukhtiar Singh is working with the Department of Electrical Engineering, Delhi Technological University, Delhi. He received the B.Tech. and M.Tech. degrees in electrical engineering from NIT, Kurukshetra, India, in 1999 and 2001, respectively. He earned his Ph.D. degree from Ecole de Technologie Superieure, University of Quebec, Montreal, Quebec, Canada in 2010. Prof. Singh is the recipient of IEEE student scholarship for one of the best paper in 34th IEEE Conference of Industrial Electronics Society, IECON-2008. He is also the winner of Researcher's Merit Scholarship of the University of Quebec, Canada for the three years consecutively (2008-2010). Prof. Singh is actively associated with IEEE and had been treasurer of IEEE, PELS-IES, Delhi chapter for 2015 and 2016. He had also been the General Chair of 5th and 6th IEEE Power India International Conference, PIICON 2012, and PIICON 2014. Prof. Singh is also recipient of premier research award of DTU for the year of 2017. He is also in the technical advisory group of leading renewable energy companies like Enercon India Ltd., Mainframe Solar and Greenergy Enterprises.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. J. Saroha, **M. Singh** and D. K. Jain, "ANFIS-based add-on controller for unbalance voltage compensation in a low-voltage microgrid," *IEEE Transactions on Industrial Informatics*, vol. 14, no. 12, pp. 5338-5345, 2018, Impact Factor: 5.43.

ANFIS-based Add-on Controller for Unbalance Voltage Compensation in a Low-voltage Microgrid

Jaipal Saroha, **Mukhtiar Singh*** and Dinesh Kumar Jain

Abstract: This paper presents an adaptive add-on controller for the unbalance voltage compensation in a low-voltage microgrid (LVMG) constituting multiple voltage source converters (VSCs) based distributed generation. The VSC-based LVMG is almost inertia-less system and any kind of load variations has a very significant impact on the voltage profile, which is highly undesirable. Presence of unbalance load at point of common coupling further exaggerates the problem. In order to mitigate the negative effect of unbalance load, an adaptive neuro-fuzzy inference system (ANFIS)-based add-on control loop has been added to the conventional VSC control. Here, the add-on controller sets the reference current gains equivalent to the voltage unbalance factor. These reference current gains obtained from the add-on controller are added to the output of a voltage control loop to set the modified reference current for an inner current control loop. The extensive simulation results with experimental validation have been provided to validate the proposed control algorithm.

For details refer to <https://doi.org/10.1109/TII.2018.2803748>

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BIOGRAPHY

DR. M. RIZWAN

Department of Electrical Engineering

Dr. M. Rizwan did his post-doctoral research at Virginia Polytechnic Institute and State University, USA. Presently he is Associate Professor at Department of Electrical Engineering, Delhi Technological University, Delhi. He has more than 16 years of teaching and research experience. Dr. Rizwan has successfully completed three research projects and guided three Ph.D. thesis in the area of renewable energy systems and published/presented more than 105 research papers in reputed international and national journals and conference proceedings. Dr. Rizwan is the recipient of Raman Fellowships for Post-Doctoral Research for Indian Scholars in USA for the Year 2016-17 and was selected for UGC research award for the period of 2014-2016. His area of interest includes power system engineering, renewable energy systems particularly solar photovoltaic, building energy management, smart grid and soft computing applications in power systems. Dr. Rizwan is Sr. Member IEEE, Life Member, ISTE, Life Member SSI, Member International Association of Engineers (IAENG), and many other reputed societies.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. A. Dube, **M. Rizwan** and M. Jamil, "New approach for maximizing generation and optimal utilization of available space for solar PV system", *Journal of Renewable and Sustainable Energy*, vol. 10, no. 6, pp. 063703, 2018, Impact Factor: 1.337.
2. G. Perveen, **M. Rizwan** and N. Goel, "Intelligent model for solar energy forecasting and its implementation for solar photovoltaic applications", *Journal of Renewable and Sustainable Energy*, vol. 10, no. 6, p.063702, 2018, Impact Factor: 1.337.

New Approach for Maximizing Generation and Optimal Utilization of Available Space for Solar PV System

Anirudh Dube, **M. Rizwan*** and Maje Jamil

Abstract: To accomplish an enormous demand of power with solar energy, a cost effective and optimum system has to be developed which works in synchronisation with the existing grid. The Government in developing countries like India is providing momentous opportunities and marvellous schemes to promote renewable energy sources like solar for generating power. This paper aims to analyse the generation of power from solar photovoltaic (PV) systems economically and efficiently as it is always a challenge for the design engineer to develop an economical and efficient solar PV system. Apart from technical issues, structural aspects also affect the power generation from PV modules. This paper proposes an innovative design of non-movable tracking system that enhances the power generation of PV modules by just providing two grooves in the mounting structure in place of the tracking system. A formula for the optimum space calculation for PV installation is also proposed in this paper. A comparative analysis of total annual energy generated by the hardware setup and the results obtained using software of the rooftop solar PV system has also been analysed for practical consideration. To verify the results, first, the system has been simulated using the PVSYST software considering all practical and existing realistic losses like PV loss due to irradiance and temperature, array soil loss, module quality loss, array mismatch loss, ohmic wiring loss, and inverter loss which formulate a bonafide case of consideration and then hardware implementation of the proposed system. The hardware and software results have been compared to analyse the proposed topologies adopted to address the aforesaid problems.

For details refer to <https://doi.org/10.1063/1.5007780>

*Corresponding Author

Intelligent Model for Solar Energy Forecasting and its Implementation for Solar Photovoltaic Applications

Gulnar Perveen, **M. Rizwan*** and Nidhi Goel

Abstract: As the demand for renewable energy is surging day-by-day, the solar energy data are important for applications in the field of solar photovoltaic (PV) systems. However, there exists a challenge in the collection of data owing to expensive instruments and a limited number of meteorological stations. In addition, the output of the system is largely affected due to variation in sky-conditions; therefore, an intelligent model based on sky-conditions is essential for estimating global solar energy so as to meet the energy requirements. In this work, the sky-based model employing fuzzy logic modelling has been developed and presented to forecast global solar energy using the dew-point as the meteorological parameter along with other known available parameters, namely, sunshine duration, wind speed, ambient temperature, and relative humidity for different sky-conditions, namely, clear sky (type-a), hazy sky (type-b), partially foggy/cloudy sky (type-c), and fully foggy/cloudy sky (type-d) respectively. Simulations have been performed for five meteorological stations across India that represents distinct climate zones such as composite, warm and humid, hot and dry, cold and cloudy, and moderate climate zone respectively, and the performance of the proposed model has been evaluated by using statistical indicators. The applicability of the proposed sky-based model employing fuzzy logic modelling can further be exploited for solar PV systems. The model is implemented in 210W PV modules in forecasting the power output of solar photovoltaic systems in different sky-conditions. The obtained results reveal that the systems employing fuzzy logic modelling can be implemented for a wide range of applications and provide benefits. Furthermore, to check for accuracy of the proposed model, a comparative analysis has been carried out with the Angstrom model using statistical indicators. The value of the results, however, shows the supremacy of the proposed fuzzy logic prediction model.

For details refer to <https://doi.org/10.1063/1.5027824>

**Corresponding Author*



BIOGRAPHY

MS. NEELU NAGPAL

Department of Electrical Engineering

Ms. Neelu Nagpal is a research scholar at Department of Electrical Engineering, Delhi Technological University. She is an Assistant Professor at Guru Gobind Indraprastha University and has been working since last 13 years in Electrical and Electronics Engineering Department, Maharaja Agrasen Institute of Technology, Delhi. She completed her Master's in 2007 with distinction from Delhi University in Control and Instrumentation specialization. Prior to that, she graduated in Electrical Engineering in first division from Delhi College of Engineering in the year 1999. Besides having 19 years of experience in teaching, she has 5 years of industrial experience and a lot of educational contributions to her name. Her area of research is investigations on the dynamics, control and estimation in the field of robotics and computational intelligence. She has 11 publications in different journals, conferences, and proceedings.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **N. Nagpal**, V. Agarwal and B. Bhushan, "A real-time state-observer-based controller for a stochastic robotic manipulator", *IEEE Transactions on Industry Applications*, vol. 54, no. 2, pp. 1806-1822, 2018, Impact Factor: 2.743.

A Real-Time State-Observer-Based Controller for a Stochastic Robotic Manipulator

Neelu Nagpal, Vijayant Agarwal and Bharat Bhushan

Abstract: In this paper, a generalized linear feedback matrix controller is investigated for the state of n-link robot to track the desired trajectory in the presence of stochastic noise. The novel feature of the control algorithm is that it is based on Ito's stochastic calculus for the minimization of the conditional expectation of the instantaneous tracking error energy differential with respect to the feedback matrix subject to energy constraints. The proposed control algorithm enables the adaptive features for tracking of the robotic manipulator. Additionally, the effects of feedback coefficients and parametric uncertainty on the error energies of the system are also studied using sensitivity analysis. Finally, the experimental results conducted using the "Phantom OmniTM Bundle" robot manipulator demonstrate and validate the potential application of the proposed control algorithm on a real system.

For details refer to <https://doi.org/10.1109/TIA.2017.2785339>



BIOGRAPHY

MS. NIKITA GUPTA

Department of Electrical Engineering

Ms. Nikita Gupta is a research scholar in Department of Electrical Engineering, Delhi Technological University. She received B.Tech. degree in Electrical and Electronics Engineering from National Institute of Technology, Hamirpur, India in 2011 and M.Tech. degree in Power System from Delhi Technological University, Delhi, India in 2014. Her research interests include power system analysis, power electronics applications in solar energy and microgrids.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **N. Gupta** and R. Garg, "Algorithm for islanding detection in photovoltaic generator network connected to low-voltage grid", *IET Generation Transmission & Distribution*, vol. 12, no. 10, pp. 2280-2287, 2018, Impact Factor: 2.618.
2. **N. Gupta** and R. Garg, "Design, development, and reliability assessment of dual output converters for SPV based DC nanogrid", *Journal of Renewable and Sustainable Energy*, vol. 10, no. 2, pp. 025502, 2018, Impact Factor: 1.337.

Algorithm for Islanding Detection in Photovoltaic Generator Network Connected to Low-voltage Grid

Nikita Gupta and Rachana Garg

Abstract: A new islanding detection method has been developed based on the analysis of negative sequence components of the voltage at the point of common coupling, using wavelet packet transform. The binary tree classifier is used for decision-making mechanism. The proposed algorithm is able to reduce the non-detection zone to zero and is able to detect islanding within 5 ms. The developed algorithm can also discriminate between the islanding and other events in the system. The simulation results carried out by MATLAB along with Simulink toolbox are used to test the performance of the proposed algorithm in a photovoltaic generator network connected to the low-voltage grid.

For details refer to <https://doi.org/10.1049/iet-gtd.2017.1735>

Design, Development, and Reliability Assessment of Dual Output Converters for SPV Based DC Nanogrid

Nikita Gupta and Rachana Garg

Abstract: A DC nanogrid for residential and commercial purposes supplies both AC and DC output voltages at different utilization levels to meet the load requirements. In this paper, the author(s) have developed a Solar Photovoltaic based DC nanogrid using dual output converter configurations which aims to improve both reliability and efficiency. The converter configurations are developed and analyzed for different levels of DC and AC output voltages in a nanogrid. Further, the performance characterization models of these converters such as sensitivity and reliability models are developed to test the robustness and effects when there is parametric variation. Markov reliability models are developed to estimate the mean time to system failure, as assessed in the Military Handbook for Reliability Prediction of Electronic Equipment (MIL-HDBK-217F). Also, the developed converter configurations are investigated in detail using MATLAB along with Simulink toolbox. Finally, the converter configurations are experimentally validated using a 100 W prototype, built, and tested in the laboratory for practical applications. The prototype model is a basic building block for further study and practical implementation for Power System designers and is useful in the areas where there is no grid. Also, the developed dual output-based system has improved energy security and reliability.

For details refer to <https://doi.org/10.1063/1.5009570>



BIOGRAPHY

MR. PRAKASH CHITTORA

Department of Electrical Engineering

Mr. Prakash Chittora is a research scholar in Delhi Technological University, Delhi. He completed his B.E. degree in electrical engineering from the Jai Narain Vyas University, Jodhpur, Rajasthan, India in 2008, and the M.Tech. degree in power system from Delhi Technological University, Delhi, India in 2010. He is currently working in the Galgotia College of Engineering and Technology as Assistant Professor in Electrical and Electronics Engineering Department. His research interest includes power electronics, power quality, and distributed generation.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01
Commendable Research Award	01

1. **P. Chittora**, A. Singh and M. Singh, "Chebyshev functional expansion based artificial neural network controller for shunt compensation", *IEEE Transactions on Industrial Informatics*, vol. 14, no. 9, pp. 3792-3800, 2018, Impact Factor: 5.43.
2. **P. Chittora**, A. Singh and M. Singh, "Simple and efficient control of DSTATCOM in three-phase four-wire polluted grid system using MCCF-SOGI based controller," *IET Generation, Transmission & Distribution*, vol. 12, no. 5, pp. 1213-1222, 2018, Impact Factor: 2.618.

Chebyshev Functional Expansion based Artificial Neural Network Controller for Shunt Compensation

Prakash Chittora, Alka Singh and Madhusudan Singh

Abstract: Three-phase four-wire (TPFW) distribution systems are prone to various power quality (PQ) issues, such as voltage fluctuations, poor power factor, unbalanced load conditions, and the presence of harmonics in current. Mitigation of these PQ problems using appropriate shunt compensator requires advanced control algorithms for control of three-phase voltage source converters (VSC) in a distribution system. In this paper, Chebyshev functional expansion based artificial neural network (ChANN) algorithm for shunt compensation using distribution static compensator (DSTATCOM) is proposed. The parameters of ChANN are trained in real time. Implementation results with linear and nonlinear loads are demonstrated on a prototype hardware designed and developed using dSPACE 1104, current and voltage sensors for the realization of DSTATCOM for TPFW system. A zigzag transformer is used along with conventional three-phase, three-wire (TPTW) DSTATCOM to reduce its overall rating. Suitable comparisons with conventional control techniques are also mentioned.

For details refer to <https://doi.org/10.1109/TII.2018.2793347>

Simple and Efficient Control of DSTATCOM in Three-phase Four-wire Polluted Grid System using MCCF-SOGI based Controller

Prakash Chittora, Alka Singh and Madhusudan Singh

Abstract: Load current may become highly distorted in a weak power system network due to the presence of non-linear and dynamic loads. Harmonics get penetrated into the supply system too; thereby making it polluted and rich in harmonic content and causing a detrimental effect on the performance of other connected loads. In such cases, the conventional control algorithms fail to work effectively to mitigate power quality (PQ) issues. This study addresses solutions to PQ issues which get aggravated in the presence of distorted supply. This study proposes a multiple complex coefficient filter (MCCF)-second-order generalised integrator (SOGI)-based controller designed to effectively compensate for PQ problems associated with weak grid. A MCCF filter is designed to extract the fundamental components of grid voltage used further for grid synchronisation. The SOGI is designed to extract the fundamental active current magnitude of the load current and reduce PQ issues with the help of Distributed Static Compensator (DSTATCOM). Neutral current compensation is achieved with an appropriately designed zigzag transformer. Extensive simulation and hardware results realising dSPACE 1104 as Digital Signal Processor are considered in this study to show that the performance of the proposed control algorithm under PQ issues with distorted grid.

For details refer to <https://doi.org/10.1049/iet-gtd.2017.0901>

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BIOGRAPHY

MS. PRIYANKA CHAUDHARY *Department of Electrical Engineering*

Ms. Priyanka Chaudhary is a research scholar at Delhi Technological University. She received her B.Tech. (Electrical) from UP Technical University, Lucknow, India, in 2010 and M.Tech. in Power System from the Delhi Technological University, Delhi, India, in 2014. She has 2 years of teaching and 3 years of research experience. She has published and presented more than 10 research papers in reputed international and national journals and conference proceedings. She is the recipient of Department of Science and Technology (Ministry of India), International Travel Grant. Her area of interest includes renewable energy systems specially solar photovoltaic systems, power system engineering, smart grid and soft computing applications in power systems etc. She is Student Member of IEEE.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. **P. Chaudhary** and M. Rizwan, “Energy management supporting high penetration of solar photovoltaic generation for smart grid using solar forecasts and pumped hydro storage system”, *Renewable Energy*, vol. 118, pp. 928-946, 2018, Impact Factor: 4.900.
2. **P. Chaudhary** and M. Rizwan, “Hybrid control approach for PV/FC fed voltage source converter tied to grid”, *International Journal of Hydrogen Energy*, vol. 43, no. 14, pp. 6851-6866, 2018, Impact Factor: 4.229.
3. **P. Chaudhary** and M. Rizwan, “Voltage regulation mitigation techniques in distribution system with high PV penetration: A review”, *Renewable and Sustainable Energy Reviews*, vol. 82, pp.3279-3287, 2018, Impact Factor: 9.184.

Energy Management Supporting High Penetration of Solar Photovoltaic Generation for Smart Grid using Solar Forecasts and Pumped Hydro Storage System

Priyanka Chaudhary and M. Rizwan

Abstract: The growing penetration level of solar photovoltaic technology is becoming a challenging task in the smart energy management systems. The power generated from the solar photovoltaic (SPV) systems is intermittent. Therefore, it is imperative to best predict the incoming solar energy and estimate the power generated from SPV systems. In this paper, the solar energy forecasting is performed using a hybrid model consisting of neural networks and wavelet transform. The performance of the proposed model is evaluated based on both root mean square error (RMSE) and mean absolute error (MAE). To validate the proposed method the above results are compared with other existing approaches like ANN and found better within desired limits. There is a pumped hydro storage (PHS) in the configuration under study to meet the grid requirements. In order to obtain more accurate and practical results, demand response (DR) program has been also integrated in the formulation of the problem. An adequacy analysis is also carried out under various consumer flexibility scenarios. Performance analysis of the proposed energy management system has been done using MATLAB/Simulink platform, and the same is validated on 5 kW SPV system. Further, the proposed model can be applied to large-scale systems.

For details refer to <https://doi.org/10.1016/j.renene.2017.10.113>

Hybrid Control Approach for PV/FC Fed Voltage Source Converter Tied to Grid

Priyanka Chaudhary and M. Rizwan

Abstract: A hybrid and adaptive control approach for solar photovoltaic system and fuel cell fed voltage source converter (VSC) is presented in this work. Further maximum power from solar photovoltaic array is extracted by using incremental conductance (INC) based maximum power point tracking approach. This hybrid approach combines $I \cos \phi$ technique and gradient descent back propagation learning (GDBP) neural network (NN) to extract fundamental components from load current for efficient harmonics compensation and provides power quality improvement and support the three-phase AC grid by supplying power to the grid and as well as connected loads. The proposed system includes photovoltaic (PV) array, a voltage source converter (VSC), ripple filter and combination of linear and non-linear loads. The proposed control approach provides a fast response during dynamic conditions as well. Results of the proposed control technique also compared with the other available control techniques for its superiority analysis. The developed control technique is demonstrated by using MATLAB/SIMULINK platform.

For details refer to <https://doi.org/10.1016/j.ijhydene.2018.02.131>

Voltage Regulation Mitigation Techniques in Distribution System with High PV Penetration: A Review

Priyanka Chaudhary and M. Rizwan

Abstract: The share of power generated from solar photovoltaic (SPV) is increasing drastically worldwide to meet the ever increasing energy demands. The power generated from the solar PV is mainly connected to low voltage (LV) distribution systems. However, the power generated from solar PV is intermittent in nature as a results it creates a problem in grid stability and reliability. The technical impacts of high PV penetration into distribution systems are mainly on the current and voltage profiles, quality of power, power balancing, protection, losses in system, power factor, etc. To address aforesaid issues lot of research is required, therefore an extensive literature review is performed considering the current status, impacts and various technical challenges due to high PV contribution. In addition, the proposed study also provides the insights to the possible solutions for voltage rise problem due to high PV penetration in LV distribution system.

For details refer to <https://doi.org/10.1016/j.rser.2017.10.017>



BIOGRAPHY

MS. SHAGUFTA KHAN

Department of Electrical Engineering

Ms. Shagufta Khan is a research scholar in Electrical Engineering from Delhi Technological University, Delhi, India. She is presently associated with Galgotias University, Greater Noida, UP, India, as Assistant Professor in the School of Electrical and Electronics Engineering. Her research interests are power systems, FACTS and HVDC systems.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **S. Khan** and S. Bhowmick, "A comprehensive power-flow model of multi-terminal PWM based VSC-HVDC systems with DC voltage droop control", *International Journal of Electrical Power & Energy Systems*, vol. 102, pp. 71-83, 2018, Impact Factor: 3.610.

A Comprehensive Power-Flow Model of Multi-terminal PWM based VSC-HVDC Systems with DC Voltage Droop Control

Shagufta Khan and Suman Bhowmick

Abstract: This paper presents power-flow models of AC power systems integrated with voltage-sourced converter (VSC) based multi-terminal high voltage direct current (MTDC) grids. Pulse-width modulation (PWM) control is employed for the VSCs. In the proposed approach, the VSC modulation indices are considered as unknowns. For control of the MTDC grid, DC voltage droop control has been implemented. The proposed method includes both linear and nonlinear voltage droop characteristics. Converter losses are included in the proposed model. Depending upon the terminal end line active power specifications of the VSCs, two different voltage droop control models have been developed. The convergence properties in the proposed approach are found to be independent of the MTDC grid location, its topology, the MTDC control strategy employed and the operating point specification. Numerous case studies are carried out by applying different control modes to multiple topologies of MTDC grids embedded in the IEEE-300 bus test system. For all the case studies, the power-flow algorithms were implemented with MATLAB. In all occurrences, a mismatch error tolerance of 10^{-10} p.u. was selected. The results validate the proposed work.

For details refer to <https://doi.org/10.1016/j.ijepes.2018.04.019>



BIOGRAPHY

DR. ALOK KUMAR SINGH

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Dr. Alok Kumar Singh received B.Sc. from University of Allahabad in 1984 and B.Tech. (Electronics and Telecommunication Engineering) and M.Tech. (Electronics) from J.K. Institute of Applied Physics, University of Allahabad in 1987 and 1991 respectively. He served BHPV Ltd. (A Government of India undertaking) in various capacities from 1991 to 1998. He worked in Ambedkar Polytechnic/Institute (under Directorate of Training and Technical Education) from 1998 to 2004. He joined Delhi College of Engineering in May, 2004. Currently, he is an Associate Professor in the Department of Electronics and Communication Engineering, Delhi Technological University, Delhi. His areas of interest are in Analog Integrated Circuits and Devices.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A.K. Singh**, P. Kumar and R. Senani, "Fully-differential current-mode higher order filters using all grounded passive elements", *AEU - International Journal of Electronics and Communications*, vol. 97, pp. 102–109, 2018, Impact Factor: 2.115.

Fully-differential Current-mode Higher Order Filters using All Grounded Passive Elements

Alok Kumar Singh, Pragati Kumar and Raj Senani

Abstract: In this paper the realization of n th order ($n \geq 3$) fully-differential current-mode filters using Current Differencing Current Conveyors (CDCC) has been presented which results in circuits employing all grounded passive elements. In contrast to earlier known realizations of fully-differential filters which invariably require more than one capacitors per pole, the proposed realization employs only one capacitor per pole. The cut-off frequency of the realized filter can be electronically tuned when all the grounded resistors associated with the integrators are implemented by identical CMOS grounded voltage-controlled-resistors (VCR) driven by a common control voltage. The methodology has been illustrated by realizing a fifth order Butterworth filter as a specific example whose workability has been verified using SPICE simulations in $0.18 \mu\text{m}$ TSMC technology. A reduced-component-version of the designed fifth order Butterworth filter has also been presented which also employs all grounded RC components but does not have electronic-tunability. Some representative simulation results have been included.

For details refer to <https://doi.org/10.1016/j.aeue.2018.10.009>



BIOGRAPHY

DR. DEVA NAND

Department of Electronics & Communication Engineering

Dr. Deva Nand received his B.Tech. in Electronics and Communication Engineering, M.Tech. in Microelectronics and VLSI Design from Kurukshetra University, Kurukshetra, India and Ph.D. from Delhi Technological University, Delhi, India. At present he is Assistant Professor in Department of Electronics and Communication Engineering, Delhi Technological University, Delhi, India. A life member of ISTE, IAENG and member of IEEE, USA. He has published papers in international journals of repute and conferences. His research interests include Analog Mixed Signal VLSI Design and Digital VLSI Design.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **D. Nand** and N. Pandey, "New configuration for OFCC-based CM SIMO filter and its application as shadow filter", *Arabian Journal for Science and Engineering*, vol. 43, no. 6, pp. 3011-3022, 2018, Impact Factor: 1.092.

New Configuration for OFCC-based CM SIMO Filter and its Application as Shadow Filter

Deva Nand and Neeta Pandey

Abstract: This paper puts forward a new operational floating current conveyor (OFCC)-based current mode (CM) single input multiple output (SIMO) filter configuration which uses two grounded capacitors, three grounded resistors and three OFCCs. The attractive features of the proposed filter are—use of grounded passive elements; availability of low pass, band pass, high pass and notch filter responses simultaneously at high output impedance; and independent adjustment of filter parameters. These features make the proposed filter suitable from fabrication viewpoint and allow easy cascading. Effect of nonidealities on proposed filter response is also examined. A CM shadow filter is also built by introducing an OFCC-based amplifier and connecting it in a feedback loop of the proposed SIMO filter. This configuration allows adjustment of filter parameters through gain of amplifier. MOS-based implementation of grounded resistors is incorporated to facilitate electronic tuning of filter parameters. The operation of the proposed filters is verified through SPICE simulations using 0.5 μ m technology model parameters from MOSIS (AGILENT). Proposed CM SIMO filter is prototyped using commercially available IC AD844, and experimental response is found to be in close agreement with theoretical ones.

For details refer to <https://doi.org/10.1007/s13369-017-3058-1>



BIOGRAPHY

MR. LALIT GOSWAMI *Department of Electronics & Communication Engineering*

Mr. Lalit Goswami is a research scholar in Department of Electronics & Communication Engineering, Delhi Technological University. He received Diploma in Engineering (Instrumentation & Control) from Board of Technical Education Delhi, B.Tech. degree (Instrumentation & Control Engineering) from Guru Gobind Singh Indraprastha University, New Delhi and M.Tech. degree (Electronics & Communication Engineering) from Maharshi Dayanand University, Rohtak, Haryana. His area of research is III-Nitride based energy efficient ultraviolet photodetectors. He has more than nine years of hands on experience to operate highly sophisticated ultra-high vacuum systems well supported by number of sensors, transducers, actuators and various process control loops. He has published various papers in international journals.

Award Summary and Publication Details

Category Title	No. of Publications
Commendable Research Award	01

1. **L. Goswami**, R. Pandey and G. Gupta, "Epitaxial growth of GaN nanostructure by PA-MBE for UV detection application", *Applied Surface Science*, vol. 449, pp. 186-192, 2018, Impact Factor: 4.439.

Epitaxial Growth of GaN Nanostructure by PA-MBE for UV Detection Application

Lalit Goswami, Rajeshwari Pandey and Govind Gupta

Abstract: We report the growth of lower aspect ratio, nano-island shaped, lower stress and strain facilitated gallium nitride nanostructures (GaN-NS) on Si (111) substrate via plasma assisted molecular beam epitaxy (PA-MBE) and fabrication of GaN-NS based UV photo-detection device even with NS's tiny dimensionality. GaN-NS were grown on Si (111) substrate with an inhomogeneous layer of Si_3N_4 which act as anti-surfactant to Ga atoms and also offer localized compressive strain. The developed strain can be relaxed by the growth of inhomogeneously oriented GaN-NS. The three dimension (3D) growth of GaN-NS in real time was observed by in-situ RHEED technique which displays transformation from streaky to spotty pattern. A micro-Raman technique has been employed to elaborate NS's crystallinity and lower stress value which is found be in good agreement with related lower strain as evaluated by HR-XRD spectra. A sharp near band edge emission at 363.2 nm is observed by room temperature photoluminescence measurement which signifies the presence of GaN. Metal semiconductor metal Au-GaN-NS/Si(111) device was fabricated to specifically analysed its ability to detect harmful ultraviolet radiations (325 nm) with GaN islands of just 26 nm height and 50 nm width. The performance of the fabricated device was analysed at fixed optical power of 13 mW with varying bias voltages (0.4–3 V).

For details refer to <https://doi.org/10.1016/j.apsusc.2018.01.287>



BIOGRAPHY

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Prof. Neeta Pandey received her M.E. in Microelectronics from Birla Institute of Technology and Sciences, Pilani and Ph.D. from Guru Gobind Singh Indraprastha University, Delhi. She has served in Central Electronics Engineering Research Institute, Pilani, Indian Institute of Technology, Delhi, Priyadarshini College of Computer Science, Noida and Bharati Vidyapeeth's College of Engineering, Delhi in various capacities. At present, she is Professor in ECE Department, Delhi Technological University. A life member of ISTE, and senior member of IEEE, USA, she has published papers in international, national journals of repute and conferences. Her research interests are in analog and digital VLSI Design.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. G. Komanapalli, **N. Pandey** and R. Pandey, "New realization of third order sinusoidal oscillator using single OTRA", *AEU-International Journal of Electronics and Communications*, vol. 93, pp. 182-190, 2018, Impact Factor: 2.115.
2. S. Oruganti, **N. Pandey** and R. Pandey, "Electronically tunable high gain current-mode instrumentation amplifier", *AEU-International Journal of Electronics and Communications*, vol. 95, pp. 16-23, 2018, Impact Factor: 2.115.
3. P. Pahalwan, P. Tripathi, P. Gola, **N. Pandey** and D. Nand, "Programmable gain amplifier using operational floating current conveyors", *AEU-International Journal of Electronics and Communications*, vol. 90, pp. 163 – 170, 2018, Impact Factor: 2.115.

New Realization of Third Order Sinusoidal Oscillator using Single OTRA

Gurumurthy Komanapalli, **Neeta Pandey*** and Rajeshwari Pandey

Abstract: In this paper, a new, single operational transresistance amplifier (OTRA) based third order sinusoidal oscillator is presented. The nonideal behavior of proposed structure has been analyzed using single and double pole models of the OTRA. It is observed that for high-frequency applications the effect of nonidealities may be eliminated through self-compensation. Active and passive sensitivities are computed for the proposed structure and are found to be less than unity rendering proposed circuit insensitive to component variations. Workability of the proposed oscillator is verified through Analog Design Environment (ADE) spectre tool provided by cadence virtuoso using 0.18 μm CMOS process parameters. Monte Carlo analysis is also carried for the proposed structure. Total harmonic distortion (THD) is found to be less than 2.6%. Post layout simulations; experimental results are also included to validate the theory.

For details refer to <https://doi.org/10.1016/j.aeue.2018.06.005>

Electronically Tunable High Gain Current-Mode Instrumentation Amplifier

Sirish Oruganti, **Neeta Pandey*** and Rajeshwari Pandey

Abstract: A new design for electronically tunable current mode (CM) instrumentation amplifier (IA) is presented in this paper. It employs Modified Z copy Current Differencing Transconductance Amplifier (MZC-CDTA) along with a resistor. The gain of the proposed CM IA is controlled by a single resistor and can theoretically approach infinite value. Electronic tuning feature is augmented by using a MOS based resistor. The functionality is verified through simulations on Cadence Virtuoso using TowerJazz's 180 nm Technology Node and performance against PVT variations is also examined. Feasibility of on-chip implementation is confirmed by the post-layout simulations carried out.

For details refer to <https://doi.org/10.1016/j.aeue.2018.07.035>

*Corresponding Author

Programmable Gain Amplifier using Operational Floating Current Conveyors

Prateek Pahalwan, Prateek Tripathi, Prashant Gola, Neeta Pandey and Deva Nand*

Abstract: This paper presents new operational floating current conveyor (OFCC) based Programmable Gain Amplifier (PGA). It operates in trans-impedance mode i.e. it receives current signal as input and provides voltage as output. It uses four blocks – a current amplifier, digitally controlled trans-impedance amplifier, digitally controlled R-2R ladder network and a voltage buffer. First block amplifies input signal. Second and third blocks of proposed PGA provide control over coarse and fine gain through bits (B_5 – B_0) and a total of 60 different gain values are possible through the arrangement. The last block provides output at low impedance thereby avoiding need of impedance matching circuit. The operation of the proposal has been verified through SPICE simulations using 0.5 μm technology model parameters from MOSIS (AGILENT). The simulated variable gain range is found to be 56.76 dB Ω to 95.84 dB Ω . The total power dissipation is 3.13 mW under maximum gain settings. The equivalent input referred noise is found to be 6.9 pA/ $\sqrt{\text{Hz}}$. Experimental verification of proposed PGA is also done by bread boarding the entire circuit. The measured results are found to be in close agreement with the theoretical and simulated values.

For details refer to <https://doi.org/10.1016/j.aeue.2018.04.022>

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BIOGRAPHY

MR. PAPPU KUMAR VERMA

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Mr. Pappu Kumar Verma is pursuing his Ph.D. in Wireless Communication from Delhi Technological University, New Delhi. He obtained his B.Tech. in Electronics & Communication Engineering from Gautam Buddha Technical University, Uttar Pradesh, India in 2010 and M.Tech. in Microwave and Optical Communication from Delhi Technological University in 2014. Currently, he is working as an Assistant Professor in the Electronics Engineering Department at Rajkiya Engineering College, Sonbhadra (UP), India. He has more than 4 years of teaching experience. He has published more than 15 research papers in international journals/conferences of repute. His research interests include wireless communications, cognitive radio networks and channel modelling.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **P. K. Verma**, S. Soni and P. Jain, "Performance evolution of ED-based spectrum sensing in CR over Nakagami-m/shadowed fading channel with MRC reception", *AEU -International Journal of Electronics and Communication*, vol. 83, pp. 512-518, 2018, Impact Factor: 2.115.

Performance Evolution of ED-based Spectrum Sensing in CR over Nakagami-m/shadowed Fading Channel with MRC Reception

Pappu Kumar Verma, Sanjay Kumar Soni and Priyanka Jain

Abstract: Internet of things contains the hefty number of devices with diverse types of communication interfaces. Therefore, these devices act as a source of interference to the primary users in the absence of appropriate collision detection technique. Spectrum sensing is the important function of cognitive radio and energy detector is the most popular technique used for spectrum sensing. Detection of the availability of unused spectrum for the secondary user becomes difficult when the channel is affected by composite multipath/shadowed fading. In this paper, analytical expressions of average probability of detection and average area under the receiver operating characteristic over Nakagami-m/log-normal with maximum ratio combining diversity are derived using Gaussian-Hermite integration approximation. In addition, an optimized threshold has been incorporated to overcome the problem of spectrum sensing even at low signal-to-noise ratio. To verify the correctness of exact results and derived analytical expressions, Monte Carlo simulations are incorporated.

For details refer to <https://doi.org/10.2016/j.aeue.2017.11.05>



BIOGRAPHY

DR. POORNIMA MITTAL

*Department of Electronics &
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Dr. Poornima Mittal received her Ph.D. degree in 2016 from Uttarakhand Technical University, Dehradun, India after competing B.Tech and M.Tech in 2004 and 2008, respectively. Her research interest includes flexible electronic devices and their circuits, VLSI system design and FPGA/VHDL based Implementation. She has more than seventy international journal & conference publications with 260 citations. She is co-author of a text Book on “Organic Thin-Film Transistor Applications: Materials to Circuits”, published by CRC Press, Taylor and Francis, UK, 2016. She is the reviewer of many international journals of IEEE, IET, Elsevier, and Taylor & Francis. She has received the research awards in 2012 and 2015 for her dedicated research at Graphic Era University, Dehradun. She is the life member of many professional societies. She has more than 13 years of teaching experience. Presently, she is working as Associate Professor in the Department of Electronics and Communication Engineering, Delhi Technological University, Delhi since March 14, 2018.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. S. Negi, **P. Mittal** and B. Kumar, “Impact of different layers on performance of OLED”, *Microsystem Technologies: Micro- and Nanosystems Information Storage and Processing Systems*, vol. 24, pp. 1-9, 2018, Impact Factor: 1.581.

Impact of Different Layers on Performance of OLED

Shubham Negi, **Poornima Mittal*** and Brijesh Kumar

Abstract: This paper explores how different layers in an organic light emitting diode (OLED) impacts its performance. Here, different layers of OLED similar to hole/electron injection layer, transport layer, and block layers are analyzed. Four experimental devices are taken into consideration and their results are compared to one over another to analyze the impact of every layer. Inside depth analysis is also performed on the device to inspect what really is happening Innermost of the OLED. It is noticed that hole and electron block layer are instrumental in improving the device luminescence performance and efficiency. There is an improvement of 16, 37 and 38% in the luminescence of the device when hole block layers and electron block layers are added. Internal device analysis reveals that increase in charge carrier concentration and carrier confinement are the reason for this improvement.

For details refer to <https://doi.org/10.1007/s00542-018-3918-y>

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BIOGRAPHY

PROF. RAJIV KAPOOR

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Prof. Rajiv Kapoor is working in the Department of Electronics and Communication Engineering, Delhi Technological University, Delhi. He has published more than 150 papers in various reputed journals and international and national conferences. He has also worked in reputed MNCs for approximately 8 years. He has 12 patents filed and 2 patents are committed to be issued a letter of award. He has undertaken 27 R&D projects related to electronic designs, system software development and application software development. His interest is to work for society by designing new products to help them. He has signed MoUs with national and international industries and universities as a Head of the Department of ECE earlier at DTU and his tenure as Principal, AIACTR. In March 2019, few industries have requested him to design certain products such as for railways, navy, microwave filter tuning by Ericsson, industry product manufacturing process automation by ITC Ltd, ultrasonic retrieval of broken instruments through multi-sensor fusion by MAIDS etc. He is interested in the design and development related to electronics, robotics, machine learning and computer vision.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **R. Kapoor**, R. Gupta, L.H. Son, S. Jha and R. Kumar, "Boosting performance of power quality event identification with KL Divergence measure and standard deviation", *Measurement*, vol. 126, pp.134-142, 2018, Impact Factor: 2.218.
2. **R. Kapoor**, R. Gupta, L.H. Son, S. Jha and R. Kumar, "Detection of power quality event using histogram of oriented gradients and support vector machine", *Measurement*, vol. 120, pp.52-75, 2018, Impact Factor: 2.218.

Boosting Performance of Power Quality Event Identification with KL Divergence Measure and Standard Deviation

Rajiv Kapoor, Rashmi Gupta, Le Hoang Son, Sudan Jha and Raghvendra Kumar

Abstract: Power quality event identification is widely recognized as one of the most interesting problems in electric engineering. It consists of two sub-problems: detection and classification. In the first step, a recognition algorithm is used to detect disturbance from power quality events. The next step classifies them into some groups by a machine learning method. In order to enhance the accuracy, a detection technique is required for classifying events in timely manner. In this paper, KL Divergence and Standard deviation are used within Support Vector Machine to detect and classify events. Experimental results with 12 events suggest a specific order of harmonic present in each event. KL Divergence and Standard deviation are obtained for voltage sag of 500 values and for harmonics with swell of 800 values. After calculating KL Divergence and Standard deviation, events are detected with more accuracy. The comparison shows that the new method achieves 94.02% of accuracy which is better than 92.33% of Abdoos et al. (2016), 93.47% of Ma et al. (2017), 89.92% of Li et al. (2016) and 93.87% of Kapoor et al. (2018).

For details refer to <https://doi.org/10.1016/j.measurement.2018.05.053>

Detection of Power Quality Event using Histogram of Oriented Gradients and Support Vector Machine

Rajiv Kapoor, Rashmi Gupta, Le Hoang Son, Sudan Jha and Raghvendra Kumar

Abstract: This paper proposes a new method to distinguish power quality events based on the Histogram of Oriented Gradients (HOG) and Support Vector Machine (SVM). We examine energy quality events such as sag, interruptions, swell, harmonic, transient, notch and flicker. The proposed method calculates numerous power quality disturbances such as flickering with harmonics, intrusion with harmonics, and sagging with harmonics. It has less processing time than the previous methods due to multiple events occurring at same time. Numerical experiments performed on a real database of power quality disturbances show that there is less calculation in the proposal in comparison with the wavelet change, S-transform and Hilbert change. Recognition with the assistance of HOG gives better and precise outcome in time area with faster reaction.

For details refer to <https://doi.org/10.1016/j.measurement.2018.02.008>



BIOGRAPHY

DR. ANIL KUMAR HARITASH

Department of Environmental Engineering

Dr. A.K. Haritash is an Associate Professor in the Department of Environmental Engineering, Delhi Technological University in Delhi. He has more than 10 years of teaching experience, and has around 15 years of research experience. His area of interest is environmental monitoring of Polycyclic Aromatic Hydrocarbons (PAHs), water quality assessment, wetland monitoring, and bioremediation. He has more than 60 publications in the form of research papers, conference proceedings, articles, and an edited (translated from English to Hindi) book. His research on biodegradation of PAHs has been conferred the status of fast breaking research in Environmental Engineering by Thomson Reuters and ScienceWatch. Dr. Haritash has been conferred state level Outstanding Faculty Award for his contribution in academics and research. He is Editorial Board member of Indian Journal of Waste Management, and Applied Chemical Engineering; and on panel of various prestigious committees as a subject expert.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. Chitrakshi and **A.K. Haritash**, “Hydrogeochemical characterization and suitability appraisal of groundwater around stone quarries in Mahendragarh, India”, *Environmental Earth Sciences*, vol. 77, no. 6, pp. 252, 2018, Impact Factor: 1.435.

Hydrogeochemical Characterization and Suitability Appraisal of Groundwater around Stone Quarries in Mahendragarh, India

Chitrakshi and **Anil Kumar Haritash***

Abstract: The present study is the first attempt to assess the impact of stone quarrying on quality of groundwater and its suitability for drinking and irrigation in Mahendragarh region of Haryana State. The suitability for drinking and irrigation was determined by comparing the observed values with prescribed standards and indices. The groundwater was found suitable for drinking for most of the parameters except TDS, total hardness, calcium, magnesium, and nitrate. With respect to suitability in agriculture, the groundwater was classified as good with the only problem of magnesium hazard in few villages located north of mining region. Based on the ratios of different anions and cations, silicate weathering and reverse base exchange were found responsible for regulation of groundwater chemistry. Most of the shallow meteoric genesis groundwater samples were classified as Na-Cl type, and the deep meteoric genesis groundwater was classified as Na-HCO₃ type. Values of base exchange and piper trilinear, too, confirmed that the groundwater belonged to either Na-Cl or Ca-Mg-Cl type. Further, FTIR analysis of crushed mined material and soil around mining area confirmed the presence of calcite and kaolinite, respectively, which confirmed that silicate weathering is regulating groundwater chemistry. The study concluded that there is no significant direct effect of stone quarrying on groundwater in Mahendragarh district.

For details refer to <https://doi.org/10.1007/s12665-018-7431-5>

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BIOGRAPHY

DR. RAJEEV KUMAR MISHRA

Department of Environmental Engineering

Dr. Rajeev K. Mishra is working as an Assistant Professor in Department of Environmental Engineering. He received his Ph.D. from IIT Roorkee in 2011. The thrust areas of his research are vehicular exhaust emissions, ultrafine particulates, environmental implications of urban transport systems, air & noise pollution monitoring and modeling, impact of urban transport on climate change and EIA. He has guided 1 Ph.D. thesis, 10 M.Tech. dissertations and 11 B.Tech. projects. He has published 29 research papers in international and 8 research papers in national journals. He has also presented 31 international and 7 national conference papers. Dr. Mishra has written 2 book chapters in Springer and Springer Nature. He is the reviewer of different international journals like Transportation Research Part D (Elsevier), Environmental Progress and Sustainable Energy (Wiley Publication), Environmental Impact Assessment Review (Elsevier), International Journal of Sustainable Built Environment (Elsevier), Urban Climate (Elsevier) and Ecological Engineering (Elsevier) etc.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. A. Kumar and **R.K. Mishra**, "Human Health Risk Assessment of Major Air Pollutants at Transport Corridors of Delhi, India", *Journal of Transport & Health*, vol. 10, pp. 132-143, 2018, Impact Factor: 2.774.

Human Health Risk Assessment of Major Air Pollutants at Transport Corridors of Delhi, India

Amrit Kumar and **Rajeev Kumar Mishra***

Abstract: The present study undertakes an assessment of human health risk regarding mortality and morbidity induced by multiple air pollutants prevailing at 36 transport corridors of the National Capital Territory (NCT) of Delhi, India. The study, covering PM₁₀, PM_{2.5}, SO₂ and NO₂, utilized the Risk of Mortality/Morbidity due to Air Pollution (Ri-MAP) model in a bid to assess the direct health impacts in the year 2016. The World Health Organization (WHO) guidelines were used to calculate mortality and morbidity for the population in 4 km² grid sizes in the vicinity of all transport corridors and the results indicate that aggravated by the vehicular traffic, the highest number of excess cases of relative excess mortality respiratory, cardiovascular and total mortality were reported at ISBT Flyover (365, 1399 and 2136), closely followed by Wazirabad Road (362, 1378 and 2096) respectively. These two transport corridors also recorded a maximum number of excess cases of morbidity regarding hospital admission due to COPD (Chronic Obstructive Pulmonary Disease) and cardiovascular illness as 18,979 and 4762 as well as 18,969 and 4761 respectively. Further, excess numbers of cases were reported in 4 km² grid sizes alongside the transport corridors throughout the megacity of Delhi, thereby presenting a very plausible scenario of traffic-induced human health risk in different residential and other areas. Such studies with a more focussed approach would help not only towards a better transport corridor planning but also help health institutions to be preferable to control excess number of such peculiar health cases in the city and elsewhere.

For details refer to <https://doi.org/10.1016/j.jth.2018.05.013>

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BIOGRAPHY

DR. DINESH KUMAR VISHWAKARMA *Department of Information Technology*

Dr. Dinesh Kumar Vishwakarma is an Associate Professor in the Department of Information Technology at Delhi Technological University, Delhi, where he has been since 2018. He received a B.Tech. from Dr. RML Awadh University, Faizabad, UP in 2002, and a M.Tech. from Motilal Nehru National Institute of Technology, Allahabad, UP, India in 2005. He received his Ph.D. from Delhi Technological University, Delhi in 2016. His research interests include Computer Vision, Machine Learning, Deep Learning, Sentiment Analysis, Fake News and Rumour Analysis, Crowd Behaviour Analysis, Person Re-Identification, Human Action and Activity Recognition. He is a Senior Member of IEEE, and a Life Time Member of ISTE. He has published various research papers in the reputed journals/IEEE Transactions. He is a reviewer of various Journals/Transactions of IEEE, Elsevier, and Springer. He has been awarded with “Premier Research Award” by Delhi Technological University, Delhi in 2018.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. H. Aggarwal and **D. K. Vishwakarma**, “Covariate conscious approach for gait recognition based upon zernike moment invariants,” *IEEE Transactions on Cognitive and Developmental Systems*, vol. 10, no. 2, pp. 397-407, 2018, Impact Factor: 1.952.

Covariate Conscious Approach for Gait Recognition based upon Zernike Moment Invariants

Himanshu Aggarwal and *Dinesh Kumar Vishwakarma**

Abstract: Gait recognition, i.e., identification of an individual from his/her walking pattern is an emerging field. While existing gait recognition techniques perform satisfactorily in normal walking conditions, their performance tend to suffer drastically with variations in clothing and carrying conditions. In this paper, we propose a novel covariate cognizant framework to deal with the presence of such covariates. We describe gait motion by forming a single 2-D spatio-temporal template from video sequence, called average energy silhouette image (AESI). Zernike moment invariants are then computed to screen the parts of AESI infected with covariates. Following this, features are extracted from spatial distribution of oriented gradients and novel mean of directional pixels methods. The obtained features are fused together to form the final well-endowed feature set. Experimental evaluation of the proposed framework on three publicly available datasets, i.e., CASIA Dataset B, OU-ISIR Treadmill Dataset B, and USF Human-ID challenge dataset with recently published gait recognition approaches, prove its superior performance.

For details refer to <https://doi.org/10.1109/TCDS.2017.2658674>

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BIOGRAPHY

MS. SAKSHI DHALL

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Ms. Sakshi Dhall is a research scholar in Department of Information Technology, Delhi Technological University, Delhi, India and is working as an Assistant Professor in Department of Mathematics, Jamia Millia Islamia, Delhi, India. She has been University Topper and University Gold Medalist in both her graduation and post-graduation done from University of Delhi, Delhi, India. She has been a regular recipient of scholarships and certificate of merits including National Mathematics Olympiad (2000) and being in National top 1% in National Graduate Physics Examination (2006-2007). She was selected as a Mentor Fellow in one of the Women in STEM Roadshow Workshops under the US Department of State held in February 2018 at Jamia Millia Islamia organized by The Ohio State University, Ohio, USA. She has published several publications in reputed international journals and conferences. Her research interests include cryptography and multimedia security. She has also presented her research work in several conferences in India and abroad.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **S. Dhall**, S.K. Pal and K. Sharma, "Cryptanalysis of image encryption scheme based on a new 1D chaotic system", *Signal Processing*, vol. 146, pp. 22-32, 2018, Impact Factor: 3.470.

Cryptanalysis of Image Encryption Scheme based on a New 1D Chaotic System

Sakshi Dhall, Saibal K. Pal and Kapli Sharma

Abstract: This paper demonstrates cryptanalysis of an image encryption scheme based on a new 1D chaotic system proposed by Zhou et al. (2014). It is claimed to possess high strength because of better chaotic properties of employed chaotic system, and use of random pixel insertion. On the contrary, several issues are identified in this image encryption scheme including improper definition of key-stream generator used in substitution step, static permutation leading to predictable diffusion and no contribution to confusion, fixed and small number of rounds, practical infeasibility of random-pixel insertion step with one-time use of utilized random values. For practical usability, one-time use condition is required to be dropped. In this case, it is analyzed that $M \times N$ cipher image can be represented as a set of linear equations (of original pixel values) derivable using $O(M.N)$ chosen plain text images. Original image is then completely recoverable using differential cryptanalysis with single differential image represented as a set of $M.N$ linear equations solvable with $O((M.N)^3)$ complexity. Experimental results demonstrate that the original image is completely recovered without any information regarding key or equivalent key-stream making author's claim of large key-space insignificant. Improvements have been proposed, with security analysis, to enhance strength of existing scheme.

For details refer to <https://doi.org/10.1016/j.sigpro.2017.12.021>



BIOGRAPHY

DR. SEBA SUSAN

Department of Information Technology

Dr. Seba Susan is an Associate Professor in the Department of Information Technology at Delhi Technological University. She completed her B.Tech in Electronics Engineering from Cochin University of Science & Technology (2002), M.E. in Electronics & Communication (2008) from Delhi College of Engineering and Ph.D. from Electrical Engineering Department of IIT Delhi (2014). Her research areas are Computer Vision, Data Mining, Speech and Natural Language Processing with the area of specialization being the use of statistical and soft computing tools for Pattern Recognition and Machine Learning. She is a member of the IEEE Computational Intelligence Society, IEEE Signal Processing Society and the IEEE Computer Society and also a life member of the Computer Society of India (CSI). She was awarded the Elsevier Outstanding Reviewer of the year award for 2015, and her biography is listed in the 2016 Marquis Whos Who of the World (33rd ed.).

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **S. Susan** and M. Hanmandlu, "Color texture recognition by color information fusion using the non-extensive entropy", *Multidimensional Systems and Signal Processing*, vol. 29, no. 4, pp. 1269-1284, 2018, Impact Factor: 2.088.

Color Texture Recognition by Color Information Fusion using the Non-extensive Entropy

Seba Susan and Madasu Hanmandlu

Abstract: Color textures have a unique inter-relationship among its color planes since they contribute information about the same recurring pattern. The average information or entropy is thus presumed to be redundant across the color planes. This is the basis of our paper, which focuses on dimensionality reduction of color texture features by averaging the entropies across multidimensional color planes, while at the same time maintaining the high accuracy of color texture recognition. The mean operation was used in summarizing the original eleven- dimensional Difference Theoretic Texture Features (DTTF) for texture classification in [3]. In this work, instead of the mean, we measure the entropy of the features across multidimensional color planes. The non-extensive entropy with the Gaussian information gain is used as the entropy measure for our experiments since it is non-linear and a good indicator of regular patterns in textures. Comparisons with the state-of-the-art prove the efficiency of our approach both in terms of accuracy and the reduced feature dimension.

For details refer to <https://doi.org/10.1007/s11045-017-0502-z>



BIOGRAPHY

PROF. AMIT PAL

Department of Mechanical Engineering

Prof. Amit Pal is working in Mechanical Engineering Department at Delhi Technological University. Dr. Pal has successfully guided more than 35 M.Tech. and 3 Ph.D. Dissertations. He has also worked as an expert member in DTC Bus Technical Specification Committee and member in CPCB's National Off-road Engine Emissions Specification Committee. Dr. Pal obtained his BE degree in Mechanical Engineering from Government Engineering College Ujjain. He got his M. Tech. in Mechanical (Automobile) Engineering from VJTI, Mumbai and Ph.D. from the Faculty of Technology, University of Delhi. He has accomplished many sponsored research projects and consultancy works. He has also organized many FDPs/seminars and conferences and delivered a number of keynote/expert/invited lectures. He has around 50 technical publications in reputed national and international journals and more than 30 publications in national/international conferences. He received best research paper awarded in the International conference on New Frontier in Biofuels. His research interests include automobile engineering, IC Engines operation in Dual Fuel/Alcohols/CNG/LPG/Biogas mode and advanced biodiesel Production Techniques.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. A.K. Yadav, **A. Pal** and A.M. Dubey, "Experimental studies on utilization of *Prunus armeniaca* L.(wild apricot) biodiesel as an alternative fuel for CI engine", *Waste and Biomass Valorization*, vol. 9, no. 10, pp. 1961-1969, 2018, Impact Factor: 1.874.

Experimental Studies on Utilization of *Prunus Armeniaca* L.(wild apricot) Biodiesel as An Alternative Fuel for CI Engine

Ashok Kumar Yadav, **Amit Pal*** and Alok Manas Dubey

Abstract: In present research work, *Prunus armeniaca* L. (Wild Apricot) Seed oil has been investigated to produce biodiesel. The free fatty acid (FFA) content of the *Prunus armeniaca* oil (PAO) was < 2%, so a single stage alkali catalyzed transesterification process was used to produce *Prunus armeniaca* methyl ester (PAME). The transesterification was conducted using optimum condition of 1% (w/w) potassium hydroxide as catalyst, 55°C reaction temperature and 60 min reaction time with constant stirring at 400 rpm. Transesterification process gave a maximum yield of 96.5% by weight of *Prunus armeniaca* biodiesel. Fuel properties determined in the study conform to standards set for the ASTM D6751 and EN 14214. PAME exhibited a satisfying oxidative stability of 6.3 h and high cetane number (58.7) compared to petrodiesel (49.7). The experiments were conducted using various blends (B5, B10, B20 and B30) of the methyl ester of PAO with diesel in a single cylinder, four strokes, and direct injection diesel engine. The test results show that the brake thermal efficiency (BTE), in general, was found to be decreased and brake specific fuel consumption (BSFC) increased with increased volume fraction of P. armeniaca biodiesel (PAME) in the blends. A marginally higher BTE and lower BSFC noticed for B5 blend than diesel. At higher load conditions, CO, UHC and smoke opacity were found lower for all PAME blends in comparison to neat diesel. The NO_x emissions were found to be increased for PAME based fuel in comparison to neat diesel. It may be concluded from the experimental investigations that PAME, can be an alternative for petrodiesel that can be used in a diesel engine without any major modification in the engine.

For details refer to <https://doi.org/10.1007/s12649-017-9935-8>

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BIOGRAPHY

MR. ANUJ KUMAR JAIN *Department of Mechanical Engineering*

Mr. Anuj Kumar Jain is a research scholar in Delhi Technological University. He is currently serving as Associate Professor in Department of Mechanical Engineering at ABES Engineering College, Ghaziabad. He graduated in Mechanical Engineering from Harcourt Butler Technological Institute (Now Harcourt Butler Technological University), Kanpur in 2004. He obtained his Master's degree in 2007 from M.A.N.I.T., Bhopal. He also worked as Assistant Professor in various private reputed college / university like The North Cap University, Gurugram, Indraprastha Engineering College, Sahibabad, Ghaziabad and BIT, Meerut. He has also served in Mawana Sugar Works, Meerut as Mechanical Engineer and Capgemini (I) Pvt. Ltd., Pune as Software Associate. He has presented and published eleven technical papers in national and international conference and journals.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A.K. Jain**, V. Rastogi and A. K. Agarwal, "A novel approach to study effects of asymmetric stiffness on parametric instabilities of multi-rotor-system", *Journal of Sound and Vibration*, vol. 413, pp. 159-172, 2018, Impact Factor: 2.618.

A Novel Approach to Study Effects of Asymmetric Stiffness on Parametric Instabilities of Multi-rotor-system

Anuj Kumar Jain, Vikas Rastogi and Atul Kumar Agarwal

Abstract: The main focus of this paper is to study effects of asymmetric stiffness on parametric instabilities of multi-rotor-system through extended Lagrangian formalism, where symmetries are broken in terms of the rotor stiffness. The complete insight of dynamic behaviour of multi-rotor-system with asymmetries is evaluated through extension of Lagrangian equation with a case study. In this work, a dynamic mathematical model of a multi-rotor-system through a novel approach of extension of Lagrangian mechanics is developed, where the system is having asymmetries due to varying stiffness. The amplitude and the natural frequency of the rotor are obtained analytically through the proposed methodology. The bond graph modeling technique is used for modeling the asymmetric rotor. Symbol-shakti[®] software is used for the simulation of the model. The effects of the stiffness of multi-rotor-system on amplitude and frequencies are studied using numerical simulation. Simulation results show a considerable agreement with the theoretical results obtained through extended Lagrangian formalism. It is further shown that amplitude of the rotor increases inversely the stiffness of the rotor up to a certain limit, which is also affirmed theoretically.

For details refer to <https://doi.org/10.1016/j.jsv.2017.10.027>



BIOGRAPHY

MR. HARWINDER SINGH

Department of Mechanical Engineering

Mr. Harwinder Singh is currently a research scholar and senior research fellow of the Department of Mechanical Engineering, Delhi Technological University. He is doing his research work under the supervision of Prof. R. S. Mishra. His areas of interest are solar thermal systems based on concentrated solar power, combined cycles especially consist with supercritical carbon dioxide cycle and organic Rankine cycle for power generation and waste heat utilization. He did his M.Tech., post B.Tech. in 2015 in the branch of Renewable Energy Technology from Mechanical Engineering Department of DTU. He also did his B.Tech. in 2013 in the branch of Mechanical Engineering from Punjab Technical University, Jalandhar.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **H. Singh** and R.S. Mishra, "Performance evaluation of the supercritical organic rankine cycle (SORC) integrated with large scale solar parabolic trough collector (SPTC) system: An exergy energy analysis", *Environmental Progress & Sustainable Energy*, vol. 37, no. 2, pp. 891-899, 2018, Impact Factor: 1.326.

Performance Evaluation of the Supercritical Organic Rankine Cycle (SORC) Integrated with Large Scale Solar Parabolic Trough Collector (SPTC) System: An Exergy Energy Analysis

Harwinder Singh and R.S. Mishra

Abstract: In this article, exergy and energy analysis of supercritical organic Rankine cycle integrated with solar parabolic trough collector (SPTC) is presented. Proposed working fluids are R600a, Toluene, R152a, isobutene, and cyclohexane for the supercritical ORC. Performance parameters including exergy efficiency, rate of exergy destruction, improvement potential, fuel depletion ratio, irreversibility ratio and expansion ratio were also examined in this study. The results of the study demonstrate that exergy efficiency increases continuously as both the solar irradiation intensity and inlet pressure of turbine increases, and R600a gives the maximum exergy efficiency among the others, i.e. around 96.09% at $GB=0.95 \text{ kW/m}^2$ and 94.37% at 17 MPa. In addition, the exergy destruction rate decreases continuously with the increase in solar irradiation intensity as well as inlet pressure of the turbine, and it has been observed that the maximum exergy destruction rate occurs in the solar collector, which is around 80% of the total exergy destruction rate of combined SPTC-SORC. Nonetheless, R600a has the minimum value of the exergy destruction rate, i.e., 1527 kW at $GB=0.5 \text{ kW/m}^2$. Alternatively, cyclohexane shows a maximum exergy destruction rate, which is around 3794 kW at $GB=0.5 \text{ kW/m}^2$. Also, SORC turbine and recuperator have a countable value of the exergy destruction rate. Finally, this study revealed that exergetic parameters like improvement potential, fuel depletion ratio and irreversibility ratio are found to be 11,859 kW, 0.579, and 0.9296 for the parabolic trough collector in the combined R600a based SPTC-SORC system.

For details refer to <https://doi.org/10.1002/ep.12735>



BIOGRAPHY

MR. MOHIT MITTAL

Department of Mechanical Engineering

Mr. Mohit Mittal is pursuing Ph.D. under the supervision of Prof. Rajiv Chaudhary in the Department of Mechanical Engineering, Delhi Technological University, Delhi. He received B. Tech. (Mechanical Engineering) and M.Tech. (Manufacturing and Automation) from Kurukshetra University and Maharshi Dayanand University in 2013 and 2015 respectively. He worked as Assistant Professor in B.S Anangpuria Educational Institute, Faridabad (under Maharshi Dayanand University, Rohtak) from 2015 to 2018. His area of interest is in polymer based composite materials.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **M. Mittal** and R. Chaudhary, "Effect of fiber content on thermal behavior and viscoelastic properties of PALF/Epoxy and COIR/Epoxy composites", *Materials Research Express*, vol. 5, no. 12, pp. 125305, 2018, Impact Factor: 1.151.

Effect of Fiber Content on Thermal Behavior and Viscoelastic Properties of PALF/Epoxy and COIR/Epoxy Composites

Mohit Mittal and Rajiv Chaudhary

Abstract: The comprehensive cognition of the thermal and viscoelastic behavior of polymeric materials is highly significant in order to determine the structure-property relationship for various applications. The prime goal of this work was to study the effect of fiber content on the thermo-mechanical performance of fiber reinforced composites. In this regard, randomly oriented chopped fibers of length 20 mm with varying fiber volume content (17%, 23%, and 34%) were used as reinforcement in an epoxy polymer matrix for the development of a coir fiber-epoxy and pineapple leaf fiber-epoxy composites by hand lay-up technique. The results of thermogravimetric analysis (TGA) and dynamic mechanical thermal analysis (DMTA) showed that the increase in thermal stability, storage modulus (E'), loss modulus (E''), and glass transition temperature (T_g) of the matrix polymer with the incorporation of coir and pineapple leaf fiber. The neat epoxy matrix shows highest damping property while 34 vol.% fiber reinforced composites show the highest stiffness than the other samples. In all cases, the storage modulus was decreased with the increase of temperature. The reduction in E' over the temperature range of 45 °C–80 °C corresponds to the phase transition. The optimum fiber volume content is 23% having the maximum thermal stability. The 23% coir and 34% pineapple leaf fiber reinforced composites have the lowest value of effectiveness coefficient 'C' obtained by the storage modulus analysis. The $\tan \delta$ and loss modulus peak of polymer matrix was shifted to the higher temperature after the addition of reinforcing fiber, which indicates that the fibers play a major role to increase the stiffness of polymer composites by imposing the restriction in mobility of polymer chains.

For details refer to <https://doi.org/10.1088/2053-1591/aae274>



BIOGRAPHY

MR. NAUSHAD AHMAD ANSARI

Department of Mechanical Engineering

Mr. Naushad Ahmad Ansari has been working as an Assistant Professor in Department of Mechanical Engineering, Delhi Technological University, Delhi since December, 2008. He has a total experience of 18 years in teaching. His area of interest and research is Thermal Engineering and more specifically in Refrigeration & Airconditioning, IC Engine and Fluid Mechanics. He has published/presented more than 25 papers in international journal/conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **N. A. Ansari**, A. Sharma, Y. Singh, "Performance and emission analysis of a diesel engine implementing polanga biodiesel and optimization using Taguchi method", *Process Safety and Environmental Protection*, vol. 120, pp. 146-154, 2018, Impact Factor: 3.44.

Performance and Emission Analysis of a Diesel Engine Implementing Polanga Biodiesel and Optimization using Taguchi Method

Naushad Ahmad Ansari, Abhishek Sharma, Yashvir Singh

Abstract: Diesel fuel emissions are the major source of air pollution and one of the main causes for the global warming worldwide. The present research is focused on the experimental study and input parameter analysis on polanga biodiesel blend, fuel injection timing, and fuel injection pressure on commonly used single cylinder 4-stroke direct injection diesel engine emissions (Unburnt Hydrocarbons-UHC, NO_x, and smoke) and thermal efficiency at full load condition. In the study, the effect of polanga blends on fuel injection timing and fuel injection pressure is considered as input factors to examine engine output parameters and minimum exhaust emission is found with the blends of polanga biodiesel. As per the thermal performance evaluation, it is observed that the operating conditions of the engine with 30% polanga biodiesel blend at 220 bar injection pressure are similar to the operating conditions with diesel. Taguchi method has been adopted to obtain a rich design matrix for optimization of parameters. The engine's input parameters are optimized with multi-response characteristics of BTE, UHC, NO_x and smoke. Multiple single-to-noise ratio (MSNR) is employed to analyze the performance characteristics from the actual value. In the study, the optimal values of BTE, UHC, NO_x, and smoke emissions obtained are 32.59%, 20.3 ppm volume, 551 ppm volume, and 94.2% respectively at 30% polanga biodiesel blend with 15°bTDC fuel injection timing and 200 bar injection pressure.

For details refer to <https://doi.org/10.1016/j.psep.2018.09.009>



BIOGRAPHY

DR. PRAVIN KUMAR

Department of Mechanical Engineering

Dr. Pravin Kumar is working as an Associate Professor in the Department of Mechanical Engineering, Delhi Technological University, Delhi. He has more than 18 years of teaching and research experience. He obtained his Ph.D. degree in Supply Chain Management from IIT Delhi and M.Tech. in Industrial Management from IIT (Banaras Hindu University), Varanasi. His research area is supply chain and operations management. He has authored a book on engineering economics, Wiley India Pvt. Ltd. and a book on Industrial Engineering and Management from Pearson Learning, India. He has also published more than 50 research papers in international journals and conferences. His research articles have been published in the journals such as Applied Soft Computing; Annals of Operations Research; Clean Technology and Environmental Policy; Environment, Development and Sustainability; International Journal of System Assurance Engineering and Management, Journal of Modelling in Management, International Journal of Mobile Communications, International Journal of Business Excellence etc.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **P. Kumar**, F. Ahmed, R. K. Singh and P. Sinha, "Determination of hierarchical relationships among sustainable development goals using interpretive structural modelling", *Environment Development and Sustainability*, vol. 20, no. 5, pp. 2119–2137, 2018, Impact Factor: 1.37.

Determination of Hierarchical Relationships among Sustainable Development Goals using Interpretive Structural Modelling

Pravin Kumar, Faisal Ahmed, Rajesh Kumar Singh and Prerna Sinha

Abstract: This paper analyses the complex interactions among the seventeen sustainable development goals (SDGs) and presents them in a hierarchical framework using interpretive structural modelling technique. The driving and dependence powers of each of these goals have been ascertained to help the developing and least developed countries improve their strategic orientation for a particular goal within a given time frame. This would also help them in prioritizing their resource allocations on a specific SDG by focusing on its hierarchical ranking on one hand and driving and dependence powers on the other.

For details refer to <https://doi.org/10.1007/s10668-017-9981-1>



BIOGRAPHY

PROF. RAJESH KUMAR

Department of Mechanical Engineering

Prof. Rajesh Kumar is currently employed in the Department of Mechanical Engineering, Delhi Technological University, Delhi. He has completed his B.Tech. in Mechanical Engineering from HBTI Kanpur, and M.Tech. in Thermal Engineering from IIT Roorkee. He received his Ph.D. from Jamia Millia Islamia, New Delhi in the area of refrigeration and air-conditioning. He has 19 years experience of teaching & research in the fields of Thermodynamics, Refrigeration & Air conditioning, Renewable energy and Fluid Mechanics. He has guided and is guiding more than 15 M.Tech. and 8 Ph.D. thesis. He has published more than 30 research papers in reputed international journals of Elsevier, ASME Transactions, ASHRAE Transaction, Wiley, Inderscience, Springer etc. His h-index is 11 (Google scholar). He is also a reviewer of Elsevier, Inderscience, Springer, Wiley. He is a life member of Solar Energy Society of India and fellow of Institution of Engineers.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. U. Sahoo, **R. Kumar**, S.K. Singh and A.K. Tripathi, "Energy, exergy, economic analysis and optimization of polygeneration hybrid solar-biomass system", *Applied Thermal Engineering*, vol. 145, pp. 685-692, 2018, Impact Factor: 3.771.
2. A. Khaliq, **R. Kumar** and E.M.A. Mokheimer, "Investigation on a solar thermal power and ejector-absorption refrigeration system based on first and second law analyses", *Energy*, vol. 164, pp. 1030-1043, 2018, Impact Factor: 4.968.

Energy, Exergy, Economic Analysis and Optimization of Polygeneration Hybrid Solar-biomass System

Umakant Sahoo, **Rajesh Kumar***, Surinder K. Singh and Arunabh K. Tripathi

Abstract: The energy, exergy, economic analysis and optimization with the objective functions of energy efficiency, exergy efficiency, VAR cooling output, desalination output and total output of the polygeneration hybrid solar and biomass system are investigated. The optimization using the objective functions, constraints and the decision variables is carried out utilizing genetic algorithm in EES software for polygeneration hybrid solar and biomass system. In this paper, the optimized values of energy efficiency, exergy efficiency, VAR cooling output, desalination output and total output of the polygeneration system are achieved to 49.85%, 20.94%, 7278 kW, 4405 kW and 14,606 kW respectively. The payback period of polygeneration hybrid solar biomass system is 1.5 years at the electricity tariff rate of ₹7.45/kWh which is less than of solar thermal and hybrid solar biomass power plant.

For details refer to <https://doi.org/10.1016/j.applthermaleng.2018.09.093>

Investigation on a Solar Thermal Power and Ejector-Absorption Refrigeration System Based on First and Second Law Analyses

Abdul Khaliq, **Rajesh Kumar*** and Esmail M.A. Mokheimer

Abstract: The energetic and exergetic performance of a solar thermal power and ejector-absorption refrigeration system is investigated. R141b, R600a, R290, R717 and R143a were employed as the working fluids for ORC and NH₃-LiNO₃ was utilized in the ejector-absorption cycle for cooling production. The energetic and exergetic output of PTC driven combined power and refrigeration cycle were evaluated along with the calculation of thermodynamic irreversibility. The distribution of solar exergy input to the cycle in term of exergy produced, destroyed due to irreversibility, and loss due to thermal exhaust to the ambient was computed and compared with the traditional energy distribution. The maximum exergy was destroyed in the PTC where it amounts to 79.61% of the overall exergy destruction. The conversion of solar exergy input to the cycle exergy output was best (14.6%) for R141b fluid and worst (3.9%) for R143a fluid. Parametric analysis of the results reveals that Solar beam radiation (SBR), turbine inlet pressure (TIP), ORC pump inlet temperature, heat transfer fluid (HTF) temperature at the inlet of PTC, and the selection of ORC working fluid have the significant effect on the energetic and exergetic outputs of solar thermal power and ejector-absorption cooling system.

For details refer to <https://doi.org/10.1016/j.energy.2018.09.049>

**Corresponding Author*



BIOGRAPHY

MR. ROOP LAL

Department of Mechanical Engineering

Mr. Roop Lal is a faculty of Mechanical Engineering Department and his research area is tribology. He has more than 20 years of teaching and research experience. He is evolved in research activities of the department and is a leading member of Tribology Lab and CASRAE. He has delivered various expert lectures in different programs such as short-term courses, faculty development programs, seminars etc. He has played an instrumental role in setting up and development of Tribology Lab.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **R. Lal** and R. C. Singh, "Experimental comparative study of chrome steel pin with and without chrome plated cast iron disc in situ fully flooded interface lubrication", *Surface Topography: Metrology and Properties*, vol. 6, no. 3, pp. 035001, 2018, Impact Factor: 2.074.

Experimental Comparative Study of Chrome Steel Pin with and without Chrome Plated Cast Iron Disc in Situ Fully Flooded Interface Lubrication

Roop Lal and R. C. Singh

Abstract: This paper reports the findings of an experimental study pertaining to the tribo dynamic investigations of contacts formed between chrome base pin and cast iron/chrome plated cast iron discs in situ conditions. Pin on disc geometrical configurations were employed for conducting the experiments at different operating parameters using SAE-15W40 lubricating oil. The fully flooded lubricating condition was insured by directed supply of lubricant at the interface. The friction coefficient, wear rate, vibration amplitude, temperature rise and sound intensity were measured at different loads (varying in the range of contact pressure 1.9–3.1 MPa) and sliding speeds ($2\text{--}10\text{ ms}^{-1}$) for the travelling distances between 1000–5000 m. Based on experimental investigations, reductions in the friction coefficient and wear rate were recorded for the chrome steel pin/chrome plated cast iron disc in comparison to chrome steel pin/cast iron disc contact. However, increases in the temperature rise, vibration, and noise were recorded with chrome steel pin/chrome plated cast iron disc contact.

For details refer to <https://doi.org/10.1088/2051-672X/aac60a>



BIOGRAPHY

PROF. VIJAY GAUTAM

Department of Mechanical Engineering

Prof. Vijay Gautam graduated in Mechanical Engineering from Delhi College of Engineering, Delhi University in 1995 and did his post graduation in Manufacturing Engineering from National Institute of Foundry and Forge Technology (NIFFT), Ranchi University in 1998. He did his Ph.D. in Mechanical Engineering under the guidance of Prof. D. Ravi Kumar, in the Department of Mechanical Engineering, IIT Delhi. He has more than 20 years of teaching experience in the field of Elastic and Plastic Behaviour of Engineering Materials, Manufacturing Processes, Mechanics of Solids, Machine Design-I & II, Metallurgy, Foundry Technology and Plasticity and Metal Forming. His research areas are focussed in the field of Metal Forming, Machine Design and Design of Automotive Components and Composite laminates and materials. He has published more than 45 research papers as first author in international journals and conferences. He is a member of SAE (Society for Automotive Engineers) and Faculty Advisor to SAE-DTU, Delhi Chapter.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	02

1. **V. Gautam** and D. R. Kumar, “Experimental and numerical investigations on springback in V-bending of tailor-welded blanks of interstitial free steel”, *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, vol. 232, no. 12, pp. 2178–2191, 2018, Impact Factor: 1.445.
2. **V. Gautam**, V. M. Raut and D. R. Kumar, “Analytical prediction of springback in bending of tailor-welded blanks incorporating effect of anisotropy and weld zone properties”, *Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications*, vol. 232, no. 4, pp. 294–306, 2018, Impact Factor: 1.281.

Experimental and Numerical Investigations on Springback in V-bending of Tailor-welded Blanks of Interstitial Free Steel

Vijay Gautam and D. Ravi Kumar

Abstract: Tailor-welded blanks of interstitial free steel are commonly used in complex automotive skin panels. The presence of weld zone, difference in thickness and high anisotropic behaviour affect forming behaviour of tailor-welded blanks significantly. Therefore, incorporation of anisotropy of the sheets and properties of the weld zone in finite element simulations is very important for accurate prediction of springback in bending of tailor-welded blanks. In this study, experimental and finite element simulations of V-bending were carried out on tailor-welded blanks of three thickness combinations, prepared by Nd-YAG laser welding of interstitial free steel sheets of thicknesses 0.8, 1.2 and 1.5 mm. The orientation of the weld line in longitudinally welded blanks was kept at 0°, 45° and 90° with respect to the rolling direction to study the effects of anisotropy on springback in V-bending. The tensile properties of the weld zone in different thickness combinations were determined and incorporated in finite element simulations for prediction of springback. It was observed that springback results were mainly governed by the springback behaviour of the thicker sheet in a particular thickness combination. Weld zone properties affect the springback of tailor-welded blanks more significantly than the anisotropy of the sheets. Accuracy of predicted values of springback in simulations increased when the properties of the weld zone were incorporated in the material model.

For details refer to <https://doi.org/10.1177/0954405416687146>

Analytical Prediction of Springback in Bending of Tailor- Welded Blanks Incorporating Effect of Anisotropy and Weld Zone Properties

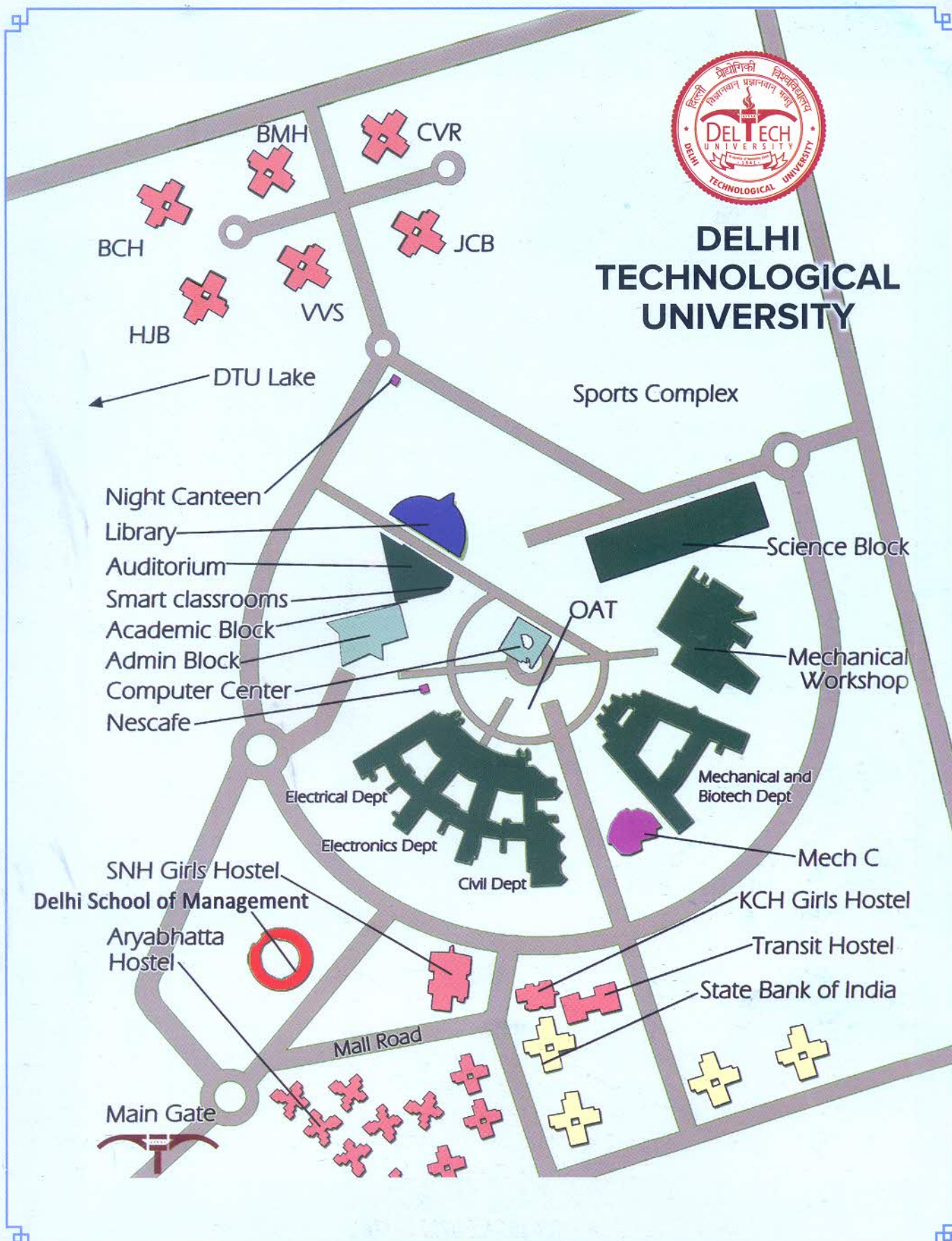
Vijay Gautam, Vinayak Manohar Raut and D. Ravi Kumar

Abstract: An analytical model for the prediction of springback in bending of longitudinally welded tailor-welded blanks of different thickness is presented in this paper. The effect of strain hardening, anisotropy and weld zone has been incorporated in the analytical model. Power law of strain hardening and Hill's anisotropic yield criterion have been used in the development of the analytical model for prediction of springback in tailor-welded blanks. The predicted values of springback are validated with experiments on V-bending of laser-welded blanks of Extra Deep Drawing quality steel sheets. Longitudinally welded specimens of three different thickness combinations with weld line oriented at 0°, 45° and 90° to the rolling direction are tested to investigate the effect of anisotropy. The springback values predicted by the analytical model incorporating the weld properties are found to be in good agreement with the experimental results in all of the cases. The springback has been found to be maximum when the weld line is oriented at 45° to the rolling direction.

For details refer to <https://doi.org/10.1177/1464420715624261>



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Electronics Dept
CIVI Dept

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