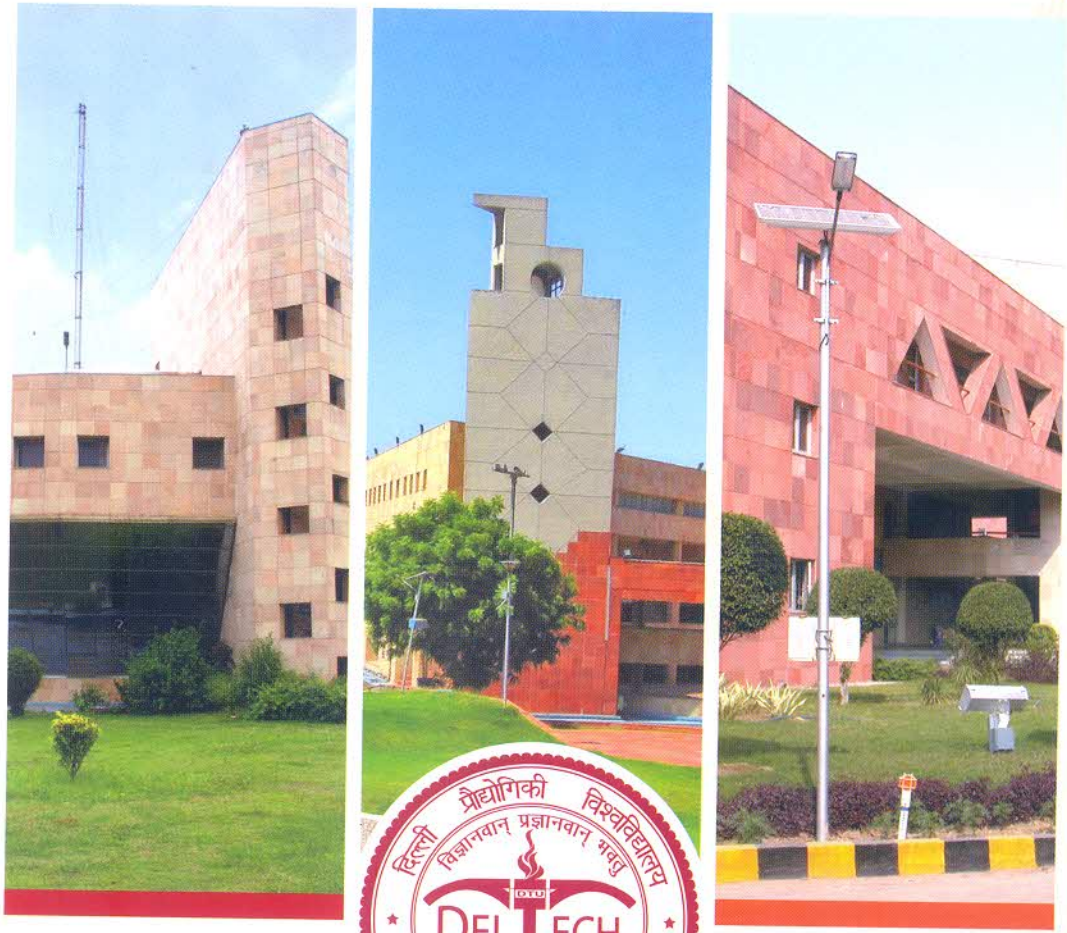
A Compendium of Abstracts of

Published Papers

for

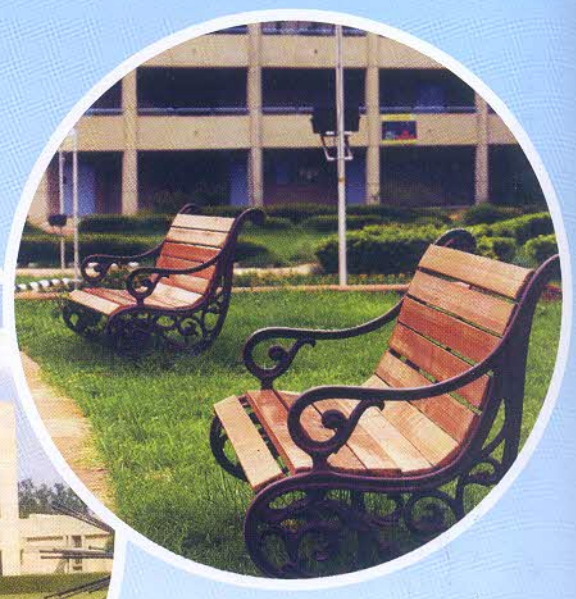
RESEARCH EXCELLENCE AWARDS

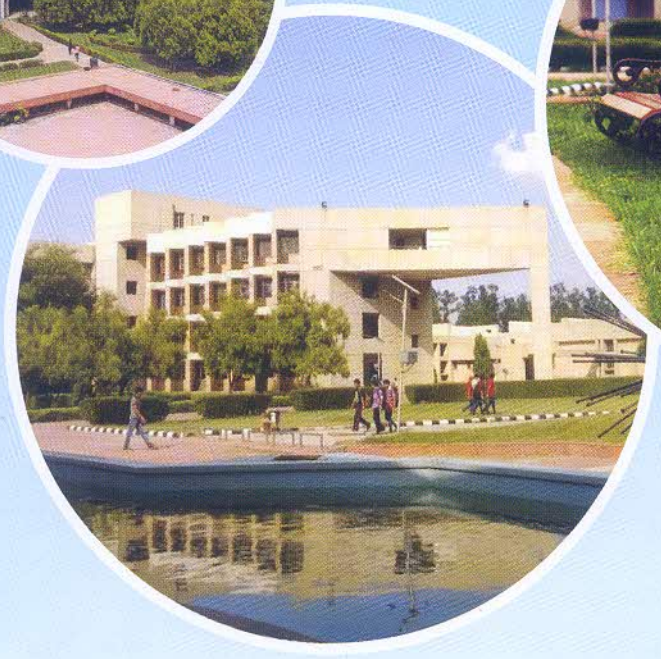
(1st January 2017 — 31st December 2017)



DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)






DELHI
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Delhi College of Engineering
Welcomes
Delhi Technological
University

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DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

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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From the Desk of The

Vice Chancellor

Delhi Technological University (formerly Delhi College of Engineering) has an illustrious history spanning over 76 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 faculty members of DTU. The eligible faculty is encouraged to apply for the publication that is written either under single authorship or jointly with university 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. This initiative will create an enabling research environment in the university and will enhance the focus on outcome-based research.

The quest for excellence in education, research and innovations in DTU is reflected by the presence of the various international and national professional societies and various student chapters such as ENACTUS DTU, IEEE DTU, CSI DTU Student chapter and many more. DTU has research collaborations with premier organizations around the globe.

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 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.

Prof. Yogesh Singh
Vice Chancellor

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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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 scholarly discussions 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 2017 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,

Prof. Ashutosh Trivedi
Dr. Ruchika Malhotra
Delhi Technological University

Details for Published Papers for Award to the Researchers of
DELHI TECHNOLOGICAL UNIVERSITY

1st January, 2017—31st December, 2017

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
1	Usha Raju, Sudhir G. Warkar and **Anil Kumar**	Green Synthesis of Multi Metal-Citrate Complexes and their Characterization	Journal of Molecular Structure, vol. 1133, pp. 90-94, 2017.	Commendable Research Award
2	Omprakash Yadav, Atul Varshney and **Anil Kumar**	Manganese(III) Mediated Synthesis of A_2B Mn(III) Corroles: A New General and Green Synthetic Approach and Characterization	Inorganic Chemistry Communications, vol. 86, pp. 168-171, 2017.	
3	Nidhi Gupta and **Deenan Santhiya**	In Situ Mineralization of Bioactive Glass in Gelatin Matrix	Materials Letters, vol. 188, pp. 127-129, 2017.	Commendable Research Award
4	Nidhi Gupta and **Deenan Santhiya**	Role of Cellulose Functionality in Bio-inspired Synthesis of Nano Bioactive Glass	Material Science & Engineering C, vol. 75, pp. 1206-1213, 2017	
5	Anuja Aggarwal, **Raminder Kaur** and R S Walia	PU Foam Derived from Renewable Sources: Perspective on Properties Enhancement: An Overview	European Polymer Journal, vol. 95, pp. 255-274, 2017.	Commendable Research Award
7	Chandra Mohan Srivastava, **Roli Purwar**, Anuradha Gupta and Deepak Sharma	Dextrose Modified Flexible Tasar and Muga Fibroin Films for Wound Healing Applications	Material Science & Engineering C, vol.75, pp. 104-114, 2017.	Commendable Research Award
8	Chandra Mohan Srivastava and **Roli Purwar**	Chitosan Finished Antheraea mylitta Silk Fibroin Nonwoven Composite Films for Wound Dressing	Journal of Applied Polymer Science, vol. 134, pp. 1-16, 2017.	
9	Gurjit Singh Walia, Saim Raza, **Anjana Gupta**, Rajesh Asthana and Kuldeep Singh	A Novel Approach of Multi-stage Tracking for Precise Localization of Target in Video Sequences	Expert Systems with applications, vol.78, pp. 208-224, 2017.	Commendable Research Award
10	Anjali Singh, **Anjana Gupta** and Aparna Mehra	Energy Planning Problems with Interval-valued 2-tuple Linguistic Information	Operational Research, vol. 17, no. 3, pp. 821-248, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
11	Aditya Jain, **Amrish K. Panwar**, Rakesh Saroha, and A. K Jha	Enhanced Structural, Dielectric, Ferroelectric and Piezoelectric Properties of (1-x) $Ba_{0.9}Sr_{0.1}TiO_3$–(x)$Ba_{0.7}Ca_{0.3}TiO_3$ Ceramics Derived using Mechano-chemical Activation Technique	Journal of the American Ceramic Society, vol. 100, no. 11, pp-5239-5248, 2017.	Commendable Research Award
12	Aditya Jain, **Amrish K. Panwar**, A. K. Jha and Yogesh Sharma	Improvement in Dielectric, Ferroelectric and Ferromagnetic Characteristics of $Ba_{0.9}Sr_{0.1}Zr_{0.1}Ti_{0.9}O_3$-$NiFe_2O_4$ Composites	Ceramic International, vol.43, pp.10253-10262, 2017.	
13	Rakesh Saroha and **Amrish K. Panwar**	Effect of In Situ Pyrolysis of Acetylene (C_2H_2) Gas as a Carbon Source on the Electrochemical Performance of $LiFePO_4$ for Rechargeable Lithium-ion Batteries	Journal Phys. D: Applied Physics, vol. 50, no. 25, pp. 255501, 2017.	
14	Rakesh Saroha, **Amrish K. Panwar**, Aditya Jain, Jitendra Singh and Sandeep Verma	Development and Electrochemical Performances of $Li_3V_2(PO_4)_3$ and $Li_4Ti_5O_{12}$ Materials for Lithium Ion Battery	Ionics, vol. 23, pp-2631-2639, 2017.	
15	Rakesh Saroha, **Amrish K. Panwar**, Akmal R. Farooq, Lucky Krishniya and P. K. Tyagi	Synthesis and Electrochemical Characterization of Graphene Nanoflakes and $LiFe_{0.97}Ni_{0.03}PO_4$/C for Lithium Ion Battery	Ionics, vol. 23, pp-2641-2650, 2017.	
16	Rakesh Saroha, A.K. Gupta and **Amrish K. Panwar**	Electrochemical Performances of Li-rich Layered-layered Li_2MnO_3-$LiMnO_2$ Solid Solutions as Cathode Material for Lithium-ion Batteries	Journal of Alloys and Compounds, vol. 696, pp. 580-589, 2017.	
17	Rakesh Saroha, **Amrish K. Panwar** and Yogesh Sharma	Physicochemical and Electrochemical Performance of $LiFe_{1-x}Ni_xPO_4$ ($0 \leq x \leq 1.0$) Solid Solution as Potential Cathode Material for Rechargeable Lithium-ion Battery	Ceramic International, vol. 43, no. 7, pp-5734–5742, 2017.	
18	Aditya Jain, **Amrish K. Panwar** and A.K. Jha	Effect of ZnO Doping on Structural, Dielectric, Ferroelectric and Piezoelectric Properties of $BaZr_{0.1}Ti_{0.9}O_3$ Ceramics	Ceramic International, vol.43, no. 2, pp.1948-1955, 2017.	
19	Rakesh Saroha, **Amrish K. Panwar**, Yogesh Sharma, Pawan K. Tyagi and Sudipto Ghosh	Development of Surface Functionalized ZnO-doped $LiFePO_4$/C Composites as Alternative Cathode Material for Lithium Ion Batteries	Applied Surface Science, vol. 394, pp. 25–36, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
20	Nisha Deopa and **A.S. Rao**	Photoluminescence and Energy Transfer Studies of Dy^{3+} Ions Doped LiPbAlB Glasses for w-LEDs and Laser Applications	Journal of Luminescence, vol.192, pp.832-841, 2017.	Commendable Research Award
21	Nisha Deopa and **A.S. Rao**	Spectroscopy Studies of Sm^{3+} Ions Doped LiPbAlB Glasses for Visible Luminescent Device Applications	Optical Materials, vol.72, pp.31-39, 2017.	
22	Nisha Deopa, **A.S. Rao**, Sk. Mahamuda, Mohini Gupta, M. Jayasimhadri, D. Haranath and G. Vijaya Prakash	Spectroscopic Studies of Pr^{3+} Ions Doped LiPbAlB Glasses for Visible Reddish Orange Luminescent Device Applications	Journal of Alloys and Compounds, vol. 708, pp. 911-921, 2017.	
23	Sumandeep Kaur, **A.S. Rao** and Mula Jayasimhadri	Spectroscopic and Photoluminescence Studies of Sm^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LED	Ceramic International, vol.43, pp.7401-7407, 2017.	
24	Ch B. Annapurna Devi, SK. Mahamuda, Koneru Swapna, Mandalapu Venkateswarlu, **A. S. Rao** and Gaddam Vijaya Prakash	Compositional Dependence of Red Luminescence from Eu^{3+} Ions Doped Single and Mixed Alkali Fluoride Tungsten Tellurite Glasses	Optical Materials, vol.74, pp.260-267, 2017.	
25	Kaushal Jha and **Mula Jayasimhadri**	Structural and Emission Properties of Eu^{3+}-doped Alkaline Earth Zinc-Phosphate Glasses for White LED Applications	Journal of American Ceramic Society, vol. 100, no. 4, pp. 1402-1411, 2017.	Commendable Research Award
26	**Mula Jayasimhadri**, Kaushal Jha, B.V. Ratnam, Hyun-Joo Woo, Kiwan Jang, A.S. Rao and D. Haranath	Single NUV Band Pumped PbO-GeO_2-TeO_2: Tb^{3+} Yellowish Green Emitting Glass Material for Tricolor White LEDs	Journal of Alloys and Compounds, vol. 711, pp. 395-399, 2017.	
27	Kaushal Jha, Amit K. Vishwakarma, **Mula Jayasimhadri** and D. Haranath	Multicolor and White Light Emitting Tb^{3+}/Sm^{3+} Co-doped Zinc Phosphate Barium Titanate Glasses via Energy Transfer for Optoelectronic Device Applications	Journal of Alloys and Compounds, vol. 719, pp. 116-124, 2017.	
28	Sumandeep Kaur, **Mula Jayasimhadri** and A.S. Rao	A Novel Red Emitting Eu^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LEDs	Journal of Alloys and Compounds, vol. 697, pp. 367-373, 2017.	
29	B.V. Ratnam, Mukesh K.Sahu, Amit K. Vishwakarma, Kaushal Jha, Hyun-JooWoo, Kiwan Jang and **Mula Jayasimhadri**	Optimization of Synthesis Technique and Luminescent Properties in Eu^{3+}-activated $NaCaPO_4$ Phosphor for Solid State Lighting Applications	Journal of Luminescence, vol. 185, pp. 99-105, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
30	R.K. Ratnesh and **Mohan Singh Mehata**	Investigation of Biocompatible and Protein Sensitive Highly Luminescent Quantum dots/ nanocrystals of CdSe, CdSe/ZnS and CdSe/CdS	Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, vol. 179, pp. 201-210, 2017.	Commendable Research Award
31	R.K. Ratnesh and **Mohan Singh Mehata**	Synthesis and Optical Properties of Core-multi-shell CdSe/CdS/ ZnS Quantum Dots: Surface Modifications	Optical Materials, vol. 64, pp. 250-256, 2017.	
32	**Mohan Singh Mehata**, Ajay K. Singh and Ravindra Kumar Sinha	Investigation of Charge-separation/ change in Dipole Moment of 7-azaindole: Quantitative Measurement using Solvatochromic Shifts and Computational Approaches	Journal of Molecular Liquids, vol. 231, pp. 39-44, 2017.	
33	Deepika Sandil, Saurabh Kumar, Kamal Arora, Saurabh Srivastava, B.D. Malhotra, Suresh C. Sharma and **Nitin K. Puri**	Biofunctionalized Nanostructured Tungsten Trioxide based Sensor for Cardiac Biomarker Detection	Material Letters, vol. 186, pp. 202-205, 2017.	Commendable Research Award
34	Gaurav Sharma, **Nitin K. Puri** and T. Nandi	Theoretical Approach for Detection and Lifetime Measurement of Obscured Low Cross-sectional Processes by the X-ray Absorption Technique	Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, vol. 408, pp. 289-293, 2017.	
35	Gaurav Sharma, **Nitin K. Puri** and T. Nandi	Lifetime Quenching due to Surface Wake Field	Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, vol. 408, pp. 178-181, 2017.	
36	Kamlesh Patel and **Pawan K. Tyagi**	Optical Effective Mass of Photon in Single and Bilayer Graphene in 10 MHz-26.5 GHz Frequency Range	Carbon, vol. 121, pp. 56-62, 2017.	Commendable Research Award
37	Reetu Kumari, Anshika Singh, Brajesh S. Yadav, Dipti Ranjan Mohapatra, Arnab Ghosh, Puspendu Guha, P V Satyam, Manoj Kumar Singh and **Pawan K Tyagi**	Filled-carbon Nanotubes: 1 D Nanomagnets Possessing Uniaxial Magnetization Axis and Reversal Magnetization Switching	Carbon, vol. 119, pp. 464-475, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
38	Kamlesh Patel and **Pawan K. Tyagi**	P-type Multilayer Graphene as a Highly Efficient Transparent Conducting Electrode in Silicon Heterojunction Solar Cells	Carbon, vol. 116, pp. 744-752, 2017.	Commendable Research Award
39	Kamlesh Patel and **Pawan K. Tyagi**	Single Layer Graphene Possessing Anomalous Dispersion with Exotic Microwave Transmission and Dielectric Properties	Journal of Alloys and Compounds, vol. 706, pp. 250-259, 2017.	
40	Anshika Singh, Puspendu Guha, Amrish K. Panwar and **Pawan K. Tyagi**	Estimation of Intrinsic Work Function of Multilayer Graphene by Probing with Electrostatic Force Microscopy	Applied Surface Science, vol. 402, pp. 271-276, 2017.	
41	Reetu Kumari, Fouran Singh, Brajesh S. Yadav, Ravinder K. Kotnala, Koteswara Rao Peta, **Pawan K. Tyagi**, Sanjeev Kumar and Nitin K. Puri	Ion Irradiation Induced Localized sp^2 to sp^3 Hybridized Carbon Transformation in Walls of Multiwalled Carbon Nanotubes	Nuclear Instruments and Methods in Physics Research B, vol. 412, pp. 115-122, 2017.	
42	Pranjala Tiwari, Kamlesh Patel, Lucky Krishnia, Reetu Kumari and **Pawan K. Tyagi**	Potential Application of Multilayer n-type Tungsten Diselenide (WSe_2) Sheet as Transparent Conducting Electrode in Silicon Heterojunction Solar Cell	Computational Material Science, vol. 136, pp. 102–108, 2017.	
43	Jaya Madan, R. S. Gupta and **Rishu Chaujar**	Numerical Simulation of N+ Source Pocket PIN-GAA - Tunnel FET: Impact of Interface Trap Charges and Temperature Affectability	IEEE Transactions on Electron Devices, vol. 64, pp. 1482-1488, 2017.	Premier Research Award
44	Neha Gupta and **Rishu Chaujar**	Quantum Analysis Based Extraction of Frequency Dependent Intrinsic and Extrinsic Parameters for GEWE-SiNW MOSFET	Journal of Computational Electronics, vol. 16, no. 1, pp.61-73, 2017.	Commendable Research Award
45	Jaya Madan, R. S. Gupta and **Rishu Chaujar**	Performance Investigation of Heterogeneous Gate Dielectric-Gate Metal Engineered-Gate All Around-Tunnel FET for RF Applications	Microsystem Technologies, vol. 23, no. 9, pp.4081-4090, 2017.	
46	Ajay Kumar, M.M. Tripathi and **Rishu Chaujar**	Investigation of Parasitic Capacitances of In_2O_5Sn Gate Electrode Recessed Channel MOSFET for ULSI Switching Applications	Microsystem Technologies, vol. 23, no. 12, pp. 5867-5874, 2017.	
47	Jaya Madan, R. S. Gupta and **Rishu Chaujar**	Mathematical Modeling Insight of Hetero Gate Dielectric Dual Material Gate GAA tunnel FET for VLSI/analog Applications	Microsystem Technologies, vol. 23, no. 9, pp.4091-4098, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
48	Rahul Pandey and **Rishu Chaujar**	Numerical Simulations of Novel SiGe-based IBC-HJ Solar Cell for Standalone and Mechanically Stacked Tandem Applications	Materials Research Bulletin, vol. 93, pp. 282-289, 2017.	Commendable Research Award
49	Ajay Kumar, Neha Gupta and **Rishu Chaujar**	Effect of Structured Parameters on Hot-Carrier Immunity of Transparent Gate Recessed Channel (TGRC) MOSFET	Microsystem Technologies, vol. 23, no. 9, pp.4057-4064, 2017.	
50	Jaya Madan and **Rishu Chaujar**	Gate Drain Underlapped-PNIN-GAA-TFET for Comprehensively Upgraded Analog/RF Performance	Superlattices and Microstructures, vol. 102, pp. 17-26, 2017.	
51	**Suresh C. Sharma**, Jyotsna Panwar and Rinku Sharma	Modeling of Terahertz Radiation Emission from a Free-electron Laser	Contributions to Plasma Physics, vol. 57, no. 4, pp. 167-175, 2017.	Commendable Research Award
52	Pratibha Malik, **Suresh C. Sharma** and Rinku Sharma	Generating Tunable THz Radiation using Rippled Density Plasma Driven by Density Modulated Relativistic Electron Beam	Physics of Plasmas, vol. 24, no. 7, pp. 073101, 2017.	
53	Ravi Gupta and **Suresh C. Sharma**	Theoretical Modeling to Study the Impact of Different Oxidizers (etchants) on the Plasma-assisted Catalytic Carbon Nanofiber Growth	Physics of Plasmas, vol. 24, no. 7, pp. 073504, 2017.	
54	Jyotsna Panwar and **Suresh C. Sharma**	Modeling the Emission of High Power Terahertz Radiation using Langmuir Wave as a Wiggler	Physics of Plasmas, vol. 24, no. 8, pp. 083101, 2017.	
55	Neha Gupta and **Suresh C. Sharma**	Effect of Gas Composition on Morphological Properties of Graphene Nanosheet	Physics of Plasmas, vol. 24, no. 7, pp. 073510, 2017.	
56	Ravi Gupta, **Suresh C. Sharma** and R. Sharma	Mechanisms of Plasma-assisted Catalyzed Growth of Carbon Nanofibres: A Theoretical Modeling	Plasma Sources Science and Technology, vol. 26, no. 2, p. 024006, 2017.	
57	**Vinod Singh**, B R Mehta, Saurabh K Sengar, Olesia M Karakulina, Joke Hadermann and Akshey Kaushal	Achieving Independent Control of Core Diameter and Carbon Shell Thickness in Pd-C Core–shell Nanoparticles by Gas Phase Synthesis	Nanotechnology, vol. 28, no. 29, pp. 295603, 2017.	Commendable Research Award
58	Nishant Shankhwar, **Yogita Kalra**, and Ravindra Kumar Sinha	$LiTaO_3$ based Metamaterial Perfect Absorber for Terahertz Spectrum	Superlattices and Microstructures, vol. 111, pp. 754-759, 2017.	Commendable Research Award
59	Preeti Rani, Shiba Fatima, **Yogita Kalra** and R.K. Sinha	Realization of All Optical Logic Gates using Universal NAND Gates on Photonic Crystal Platform	Superlattices and Microstructures, vol. 109, pp. 619-625, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
60	Renu Sharma, Dhiraj Kumar, Niraj Kumar Jha, Saurabh Kumar Jha, Rashmi K Ambasta and **Pravir Kumar**	Re-expression of Cell Cycle Markers in Aged Neurons and Muscles: Whether Cell should Divide or Die?	Biochimica et Biophysica Acta: BBA Molecular Basis of disease, vol. 1863, no. 1, pp. 324-336, 2017.	Commendable Research Award
61	Saurabh Kumar Jha, Niraj Kumar Jha, Dhiraj Kumar, Rashmi K Ambasta and **Pravir Kumar**	Linking Mitochondrial Dysfunction, Metabolic Syndrome and Stress Signaling in Neurodegeneration	Biochimica et Biophysica Acta, BBA Molecular Basis of disease, vol. 1863, no. 5, pp. 1132-1146, 2017.	
62	Saurabh Kumar Jha, Niraj Kumar Jha, Dhiraj Kumar, Renu Sharma, Abhishek Shrivastava, Rashmi K Ambasta and **Pravir Kumar**	Stress-induced Synaptic Dysfunction and Neurotransmitter Release in Alzheimer's Disease: Can Neurotransmitter and Neuromodulator be Potential Therapeutic Targets?	Journal of Alzhemier Disease, vol. 57, no. 4, pp. 1017-1039, 2017.	
63	Isha Srivastava, Pooja Khurana, Mohini Yadav and **Yasha Hasija**	An Integrative System Biology Approach to Unravel Potential Drug Targets for Multiple Age related Disorders	BBA- Proteins and Proteomics, vol. 1865, no. 12, pp. 1729-1738, 2017.	Commendable Research Award
64	**Ashutosh Trivedi**	Comments on Modulus Ratio and Joint Factor Concepts to Predict Rock Mass Response	Rock Mechanics Rock Engineering, vol. 50, no. 5, pp. 1357–1362, 2017.	Commendable Research Award
65	**Anil Singh Parihar,** Om Prakash Verma and Chintan Khanna	Fuzzy-Contextual Contrast Enhancement	IEEE Transactions on Image Processing, vol. 26, no. 4, pp. 1810-1819, 2017.	Premier Research Award
66	**Rahul Katarya** and Om Prakash Verma	Effectual Recommendations using Artificial Algae Algorithm and Fuzzy c-mean	Swarm and Evolutionary Computation, vol. 36, pp. 52-61, 2017.	Commendable Research Award
67	**Rahul Katarya** and Om Prakash Verma	An Effective Web Page Recommender System with Fuzzy c-mean Clustering	Multimedia Tools and Applications, vol. 76, no. 20, pp. 21481-21496, 2017.	

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
68	**Ruchika Malhotra**, Megha Khanna and Rajeev Raje	On the Application of Search-Based Techniques for Software Engineering Predictive Modeling: A Systematic Review and Future Directions	Swarm and Evolutionary Computation, vol. 32, pp. 85-109, 2017.	Commendable Research Award
79	**Ruchika Malhotra** and Megha Khanna	An Empirical Study for Software Change Prediction using Imbalanced Data	Empirical Software Engineering, vol. 22, no. 6, pp. 2806-2851, 2017.	
70	**Ruchika Malhotra** and Megha Khanna	An Exploratory Study for Software Change Prediction in Object-Oriented Systems using Hybridized Techniques	Automated Software Engineering, vol. 24, no. 3, pp. 673-717, 2017.	
71	Ashutosh Trivedi and **Mukhtiar Singh**	Repetitive Controller for VSIs in Droop-Based AC-Microgrid	IEEE Transactions on Power Electronics, vol. 32, no. 8, pp. 6595-6604, 2017.	Premier Research Award
72	**Vishal Verma** and Amritesh Kumar	Cascaded Multilevel Active Rectifier Fed Three-Phase Smart Pump Load on Single Phase Rural Feeder	IEEE Transactions on Power Electronics, vol. 32, no. 7, pp. 5398-5410, 2017.	Premier Research Award
73	**Dinesh Kumar Vishwakarma** and Kuldeep Singh	Human Activity Recognition Based on Spatial Distribution of Gradients at Sublevels of Average Energy Silhouette Images	IEEE Transactions on Cognitive and Developmental Systems, vol. 9, no. 4, pp. 316-327, 2017.	Premier Research Award
74	**Jayanthi Natarajan** and Indu Sreedevi	Enhancement of Ancient Manuscript Images by Log based Binarization Technique	AEU-International Journal of Electronics and Communications, vol. 75, pp. 15-22. 2017.	Commendable Research Award
75	**Om Prakash Verma** and Anil Singh Parihar	An Optimal Fuzzy System for Edge Detection in Color Images using Bacterial Foraging Algorithm	IEEE Transaction on Fuzzy System, vol. 25, no. 1, pp. 114-127, 2017.	Premier Research Award
76	**A. K. Haritash**, Karamveer Mathur, Priyanka Singh, S. K. Singh	Hydrochemical Characterization and Suitability Assessment of Groundwater in Baga–Calangute Stretch of Goa, India	Environmental Earth Sciences, vol. 76, no. 9, pp. 341, 2017.	Commendable Research Award

S. No.	Author Name	Paper Title	Journal with Publication Details	Award Category Name
77	**Seba Susan** and Monika Sharma	Automatic Texture Defect Detection using Gaussian Mixture Entropy Modeling	Neurocomputing, vol. 239, pp. 232-237, 2017.	Commendable Research Award
78	**N. Yuvaraj**, S. Aravindan and Vipin	Comparison Studies on Mechanical and Wear Behavior of Fabricated Aluminium Surface Nano Composites by Fusion and Solid State Processing	Surface & Coating Technology, vol. 309, pp. 309-319, 2017.	Commendable Research Award
79	**Mohammad Zunaid**, Qasim Murtaza and Samsher Gautam	Energy and Performance Analysis of Multi Droplets Shower Cooling Tower at Different Inlet Water Temperature for Air Cooling Application	Applied Thermal Engineering, vol. 121, pp. 1070-1079, 2017.	Commendable Research Award
80	**Pravin Kumar**, Rajesh Kumar Singh, and Anurika Vaish	Suppliers' Green Performance Evaluation using Fuzzy Extended ELECTRE Approach	Clean Technologies and Environmental Policies, vol. 19, no. 3, pp. 809-821, 2017.	Commendable Research Award
81	**Pravin Kumar**, Rajesh Kumar Singh, and Karishma Kharab	A Comparative Analysis of Operational Performances of Cellular Mobile Telephone Service Providers in the Delhi Working Area using an Approach of Fuzzy ELECTRE	Applied Soft Computing, vol. 59, pp. 438-447, 2017.	
82	Umakant Sahoo, **Rajesh Kumar**, Pradeep Chandra Pant and Rajiv Chaudhary	Development of an Innovative Polygeneration Process in Hybrid Solar-biomass System for Combined Power, Cooling and Desalination	Applied Thermal Engineering, vol. 120, pp. 560–567, 2017.	Commendable Research Award

Biography

Dr. Anil Kumar

Department of Applied Chemistry

Dr. Anil Kumar is an Assistant Professor at the Department of Applied Chemistry, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. He received his master's and doctorate degree in chemistry from the University of Roorkee, Roorkee (Now IIT Roorkee) and Indian Institute of Technology, Kanpur, India, respectively. He has received Academia Sinica fellowship, Taiwan, from 2007-2009 and Schulich post-doctoral fellowship, Technion, IIT Haifa, Israel 2009-2010. His research interests are in coordination chemistry, porphyrinoid based bio-inorganic chemistry. He has published 30 research papers in international journals and conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. U. Raju, S. G. Warkar and **A. Kumar**, "Green Synthesis of Multi Metal-Citrate Complexes and their Characterization", *Journal of Molecular Structure*, vol. 1133, pp. 90-94, 2017. Impact Factor: 1.753.

2. O. Yadav, A. Varshney and **A. Kumar,** "Manganese(III) Mediated Synthesis of A_2B Mn(III) Corroles: A New General and Green Synthetic Approach and Characterization", *Inorganic Chemistry Communications*, vol. 86, pp. 168-171, 2017. Impact Factor: 1.640.

Green Synthesis of Multi Metal- Citrate Complexes and Their Characterization

Usha Raju, Sudhir G. Warkar and **Anil Kumar***

Abstract: Four new multi metal-citrate complexes have been synthesized through green synthetic pathways. Their synthesis by hydrothermal route in the present research is decorated with features such as, a simple one pot synthesis, cost effectiveness, easy to scale up for commercial production, efficient synthesis conditions like mild temperature and shorter duration which further rules out the possibility of forming byproducts which may cause damage to the environment and being environmental benign as it eliminates the use and recovery of harmful organic solvents such as *N*, *N*- dimethyl formamide and *N*, *N*-diethyl formamide, used by the researchers in the past during the synthesis of similar metal-organic framework complexes. All four complexes are well defined crystalline materials with polynuclear multi metal-citrate framework having cubic crystal structure as indicated by their Powder X-ray Diffraction patterns. These complexes have been characterized by Fourier Transform Infrared Spectroscopy, Scanning Electron Microscopy, Energy Dispersive X-ray Spectroscopy, Thermogravimetric analysis and Powder XRD techniques.

For details refer to https://doi.org/10.1016/j.molstruc.2016.11.084

Manganese(III) Mediated Synthesis of A_2B Mn(III) Corroles: A New General and Green Synthetic Approach and Characterization

Omprakash Yadav, Atul Varshney and **Anil Kumar***

Abstract: A new general and green synthetic protocol for the synthesis of manganese(III) metallocorroles has been developed from substituted aryl aldehydes and 5-(4-nitrophenyl) dipyrromethane using manganese salt as template. This is the first report in the synthesis of corroles: the formation of direct C–C bond through metal initiation. This method allows higher working concentrations than those previously reported. The new A_2B manganese(III) metallocorroles were synthesized in good yield for different applications. The single crystal X-ray structure of 10-(3,4,5-fluorophenyl)-5,15-bis(4-nitrophenyl)manganese(III) corrole is also reported and shows that manganese atom is situating atop on macrocyclic plane.

For details refer to https://doi.org/10.1016/j.inoche.2017.10.018

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Biography

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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 Eight independent 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	02

1. N.Gupta and **D. Santhiya**, "In Situ Mineralization of Bioactive Glass in Gelatin Matrix", *Materials Letter*, vol. 188, pp. 127-129, 2017. Impact Factor: 2.572.
2. N.Gupta and **D. Santhiya**, "Role of Cellulose Functionality in Bio-inspired Synthesis of Nano Bioactive Glass", *Materials Science Engineering C*, vol. 75, pp. 1206-1213, 2017. Impact Factor: 4.164.

In Situ Mineralization of Bioactive Glass in Gelatin Matrix

Nidhi Gupta and **Deenan Santhiya***

Abstract: Bioactive glass has been focused recently in soft tissue engineering, which requires biomaterials suitable for complex designing along with mechanical strength. Considering this, first time an attempt has been made to investigate in situ mineralization of bioactive glass nodules in gelatin matrix with noticeable creep property in comparison to in situ mineralized bioactive glass needles in glutaraldehyde crosslinked gelatin film along with substantially improved toughness and textural properties.

For details refer to https://doi.org/10.1016/j.matlet.2016.11.045

Role of Cellulose Functionality in Bio-inspired Synthesis of Nano Bioactive Glass

Nidhi Gupta and **Deenan Santhiya***

Abstract: In search of abundant cheaper natural polymer for bio-inspired bioactive glass nanoparticles synthesis, cellulose and its derivatives have been considered as a template. Different templates explored in the present studies are pure cellulose, methyl cellulose and amine grafted cellulose. To the best of our knowledge, for the first time of the considered templates, pure cellulose and amine grafted cellulose results in *in situ* nano particulate composite formation while interestingly methyl cellulose proves to be an excellent sacrificial template for the synthesis of uniform bioglass nanoparticles of diameter in the range of 55 nm. Further, viscoelastic measurements were carried out using dynamic mechanical analyzer. Herein, an attempt has been made to establish structure-mechanical relationship based on the templates. Moreover, *in vitro* bioactivity is also observed to be affected by the nature of the template molecule used for the synthesis of bioactive glass.

For details refer to https://doi.org/10.1016/j.msec.2017.03.026

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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 20 research papers in international journals, one book chapter and about 15 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 and The Society of Polymer Science, India.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. A. Aggarwal, **R. Kaur** and R. S. Walia,"PU Foam Derived from Renewable Sources: Perspective on Properties Enhancement: An Overview", *European Polymer Journal*, vol. 95, pp. 255-274, 2017. Impact Factor: 3.531.

PU Foam Derived from Renewable Sources: Perspective on Properties Enhancement: An Overview

Anuja Aggarwal, **Raminder Kaur*** and R S Walia

Abstract: Polymeric foams derived from renewable sources are a requirement of the modern world due to increasing concern about the environment and various issues related to petroleum based foams. Much research has been conducted recently to produce foams using renewable sources; however, low mechanical strength, high flammability and low thermal stability are a matter of concern when using these foams on a commercial scale. Various approaches may be used to overcome these problems, including the modification of raw material or the incorporation of property-enhancing fillers, with or without surface treatment. In this overview, various methods that may be used to enhance mechanical, thermal and flame retardant properties of renewable source-based and other environmentally benign polyurethane foams are discussed.

For details refer to https://doi.org/10.1016/j.eurpolymj.2017.08.022

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Biography

Dr. Roli Purwar

Department of Applied Chemistry

Dr. Roli Purwar is working as Assistant Professor in the discipline of Polymer Science and Chemical Technology, Department of Applied Chemistry, Delhi Technological University (DTU). In addition to academics, she is holding position of Assistant Director of International Affairs and Co-Coordinator, IPR cell at DTU. She obtained her Bachelor of Engineering in Textile Technology from Sri Vaishnav Institute of Technology and Science, Indore in the year 2000. She did M.Tech in Fiber Science and Technology in the year 2001 and completed her PhD in Technical Textiles from IIT Delhi in the year 2006. She worked as Research Associate in the Department of Industrial Research and Development, IIT Delhi on projects funded by Department of Biotechnology, Govt. of India and M/S Lockheed Matrin, USA. She developed several technologies which has been transferred to Industries. Two patents (1 Indian, 1 US patent) are in her credit. She has written 5 book chapters for international publishers such as Nova, Elsevier, Woodhead etc. Dr. Purwar has published 60 research papers in Indian and International peer reviewed journals and conferences. Her current research area includes antimicrobial textiles using natural products, wound dressing materials, polymeric membranes for decontamination.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. C. M. Srivastava, **R. Purwar**, A. Gupta and D. Sharma, "Dextrose Modified Flexible Tasar and Muga Fibroin Films for Wound Healing Applications", *Materials Science and Engineering C*, vol.75, pp. 104-114, 2017. Impact factor: 3.9.

2. C. M. Srivastava and **R. Purwar**, "Chitosan Finished *Antheraea mylitta* Silk Fibroin Nonwoven Composite Films for Wound Dressing", *Journal of Applied Polymer Science*, vol. 134, pp. 1-16, 2017. Impact factor:1.8.

Dextrose Modified Flexible Tasar and Muga Fibroin Films for Wound Healing Applications

Chandra Mohan Srivastava, **Roli Purwar***, Anuradha Gupta and Deepak Sharma

Abstract: This paper is focused on preparation and characterization of regenerated muga and tasar fibroin flexible films from cocoon using ionic liquid. These flexible muga and tasar fibroin films were prepared by incorporating dextrose (5 to 15% *w*/w) as plasticizer. The mechanical, thermal, physical, morphological and biological properties of dextrose plasticized muga and tasar fibroin films were characterized. These plasticized films showed higher elongation at break as well as water holding capacity as compared to the un-plasticized films. The surface roughness and water absorbance capacity of the dextrose plasticized films were higher than un-plasticized films, which results in improved adherence and proliferation of L929 fibroblast cells. Gentamicin loaded plasticized muga and tasar fibroin films showed slightly higher rate of release as compared to un-plasticized films. The biodegradability of dextrose plasticized films was significantly higher as compared to their respective counterpart. The regeneration of flexible muga and tasar silk fibroin films pave the way to expand potential use of non-mulberry in the field of biomedical such as wound dressing.

For details refer to https://doi.org/10.1016/j.msec.2017.02.021

Chitosan Finished *Antheraea mylitta* Silk Fibroin Nonwoven Composite Films for Wound Dressing

Chandra Mohan Srivastava and **Roli Purwar***

Abstract: In this study, we aimed to produce nonwoven wound-dressing films made of *Antheraea mylitta* (tasar) silk fibroin by a solution-casting method. These nonwoven films were finished with chitosan solutions of different concentrations ranging from 0.75 to 2% w/v with a pad–dry method to fabricate nonwoven composite films. Chitosan-finished tasar fibroin nonwoven composite films (CMTFFs) showed higher mechanical and dynamic mechanical properties as compared to nonwoven tasar fibroin. The physical, structural, and thermal properties of the films were investigated. The hemocompatibility, cytocompatibility, and biodegradation tests showed that the CMTFF was a promising material for use as a wound dressing.

For details refer to https://dx.doi.org/10.1002/app.44341

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Biography

Dr. Anjana Gupta

Department of Applied Mathematics

Dr. Anjana Gupta is currently working as a Professor in the Department of Applied Mathematics, Delhi Technological University since October 2016. She joined DTU as Associate Professor in October 2012. 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 BSc (Hons.) Mathematics, MSc(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. She has published numerous research papers in journal of international repute and proceedings of international conferences. Professor Anjana Gupta is life time member of Indian Science Congress Association. She specializes in Mathematical Programming, Optimization Techniques, Fuzzy Logics and optimization, Computing with words, Supply Chain management, Multicriteria Decision Making, Image processing, Machine learning.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. G.S. Walia, S. Raza, **A. Gupta**, R. Asthana and K.Singh "A Novel Approach of Multi-stage Tracking for Precise Localization of Target in Video Sequences", *Expert Systems with Applications*, vol.78, pp. 208-224, 2017. Impact factor: 3.928.

2. A. Singh, **A. Gupta** and A. Mehra, "Energy Planning Problems with Interval-valued 2-tuple Linguistic Information", *Operational Research*, vol. 17, no. 3, pp. 821-248, 2017. Impact factor:1.065.

A Novel Approach of Multi-stage Tracking for Precise Localization of Target in Video Sequences

Gurjit Singh Walia, Saim Raza, **Anjana Gupta***, Rajesh Asthana and Kuldeep Singh

Abstract: Visual tracking methods are mostly based on single stage state estimation that limitedly caters to precise localization of target under dynamic environment such as occlusion, object deformation, rotation, scaling and cluttered background. In order to address these issues, we introduce a novel multi-stage coarse-to-fine tracking framework with quick adaptation to environment dynamics. The key idea of our work is to propose two-stage estimation of object state and to develop an adaptive fusion model. Coarse estimation of object state is achieved using optical flow and multiple fragments are generated around this approximation. Precise localization of object is obtained through evaluation of these fragments using three complementary cues. Adaptation of proposed tracker to dynamic environment changes is quick due to incorporation of context sensitive cue reliability, which encompass its direct application for development of expert system for video surveillance. In addition, proposed framework caters to object rotation and scaling through a random walk state model and rotation invariant features. The proposed tracker is evaluated over eight- benchmarked color video sequences and competitive results are obtained. As an average of the outcomes, we achieved mean center location error (in pixels) of 6.791 and F-measure of 0.78. Results demonstrate that proposed tracker not only outperforms various state-of-the-art trackers but also effectively caters to various dynamic environments.

For details refer to https://doi.org/10.1016/j.eswa.2017.02.007

Energy Planning Problems with Interval-valued 2-tuple Linguistic Information

Anjali Singh, **Anjana Gupta*** and Aparna Mehra

Abstract: In this paper, we address to the concern as to which alternative is most suitable for energy production in a new power plant set up in India. We model this problem as a multi-criteria group decision making problem where the criteria values are described in terms of interval-valued 2-tuple linguistic variables. We propose to solve this model by extending the PROMETHEE II method to interval-valued 2-tuple linguistic variables where the criteria weights in the PROMETHEE II method are supplied using the entropy measure. A small example is presented to illustrate the practicality and usefulness of the proposed method.

For details refer to https://doi.org/10.1007/s12351-016-0245-x

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Biography

Dr. Amrish K. Panwar

Department of Applied Physics

Dr. Amrish K. Panwar is working as an Assistant Professor with the Department of Applied Physics, Delhi Technological University (DTU), 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 PhD degree, he joined department of Metallurgical & Materials Engineering, IIT Kharagpur, W.B. as Postdoctoral Research Associate from 2006 to 2008. His area of research includes: energy storage and conversion devices (lithium/ sodium ion batteries/ supercapacitors) materials synthesis to prototype device fabrication, study of multiferroic and thermoelectric materials, surface modification of low energy solids. Dr. Panwar has been awarded 'Young Scientist fast track project' as a Principal Investigator by SERB-DST, Govt. of India during 2012-2015. He also received equipment grant of Rs. 23 lakh under DST sponsored FIST project (2012 to 2017). He has supervised 02 Ph.D., 19 M.Tech and more than 50 B. Tech. students. He has published about 60 research papers in Journals of International repute and in proceedings of national/ International Conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	09

1. A. Jain Aditya, **A. K. Panwar**, R. Saroha R and A. K. Jha, "Enhanced Structural, Dielectric, Ferroelectric and Piezoelectric Properties of (1-x)$Ba_{0.9}Sr_{0.1}TiO_3$–(x) $Ba_{0.7}Ca_{0.3}TiO_3$ Ceramics Derived using Mechano-chemical Activation Technique", *Journal of the American Ceramic Society*, vol. 100, no. 11, pp-5239-5248, 2017. Impact Factor: 2.841.

2. A. Jain, **A. K. Panwar**, A. K. Jha and Y. Sharma, "Improvement in Dielectric, Ferroelectric and Ferromagnetic Characteristics of $Ba_{0.9}Sr_{0.1}Zr_{0.1}Ti_{0.9}O_3$-$NiFe_2O_4$ composites", *Ceramic International*, vol.43, pp.10253-10262, 2017. Impact Factor: 2.986.

3. R. Saroha and **A. K. Panwar**, "Effect of In Situ Pyrolysis of Acetylene (C_2H_2) Gas as a Carbon Source on the Electrochemical Performance of $LiFePO_4$ for Rechargeable Lithium-ion Batteries", *Journal of Physics D: Applied Physics*, vol. 50, no. 25, pp. 255501, 2017. Impact Factor: 2.588.

4. R. Saroha, **A. K. Panwar**, A. Jain, J. Singh and S. Verma, "Development and Electrochemical performances of $Li_3V_2(PO_4)_3$ and $Li_4Ti_5O_{12}$ Materials for Lithium Ion Battery", *Ionics*, vol. 23, pp-2631-2639, 2017. Impact Factor: 2.112.

5. R. Saroha, **A. K. Panwar**, R. Farooq Akmal, L. Krishniya and P.K. Tyagi, "Synthesis and Electrochemical Characterization of Graphene Nanoflakes and $LiFe_{0.97}Ni_{0.03}PO_4$/C for Lithium Ion Battery", *Ionics*, vol. 23, pp- 2641-2650, 2017. Impact Factor: 2.112.

6. R. Saroha, A. K. Gupta and **A. K. Panwar**, "Electrochemical Performances of Li-rich Layered-layered Li_2MnO_3-$LiMnO_2$ Solid Solutions as Cathode Material for Lithium-ion Batteries", *Journal of Alloys and Compounds*, vol. 696, pp. 580-589, 2017. Impact Factor: 3.133.

7. R. Saroha, **A. K. Panwar** and Y. Sharma, "Physicochemical and Electrochemical Performance of $LiFe_{1-x}Ni_xPO_4$ ($0 \leq x \leq 1.0$) Solid Solution as Potential Cathode Material for Rechargeable Lithium-ion Battery", *Ceramic International*, vol. 43, no. 7, pp- 5734–5742, 2017. Impact Factor: 2.986.

8. A. Jain, **A. K. Panwar** and A. K. Jha, "Effect of ZnO Doping on Structural, Dielectric, Ferroelectric and Piezoelectric Properties of $BaZr_{0.1}Ti_{0.9}O_3$ Ceramics", *Ceramic International*, vol.43, no. 2, pp.1948-1955, 2017. Impact Factor: 2.986.

9. R. Saroha, **A. K. Panwar**, Y. K. Sharma, P.K. Tyagi and S. Ghosh, "Development of Surface Functionalized ZnO-doped $LiFePO_4$/C Composites as Alternative Cathode Material for Lithium Ion Batteries", *Applied Surface Science*, vol. 394, pp. 25–36, 2017. Impact Factor: 3.387.

Enhanced Structural, Dielectric, Ferroelectric, and Piezoelectric Properties of (1–x)$Ba_{0.9}Sr_{0.1}TiO_3$–(x) $Ba_{0.7}Ca_{0.3}TiO_3$ Ceramics Derived using Mechano-Chemical Activation Technique

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

Abstract: The effect of $Ba_{0.7}Ca_{0.3}TiO_3$ (BCT) substitution on the structural, dielectric, ferroelectric, and piezoelectric properties of mechano-chemically synthesized lead-free $(1-x)Ba_{0.9}Sr_{0.1}TiO_3$-$(x)Ba_{0.7}Ca_{0.3}TiO_3$ (x=0.0, 0.10, 0.20, 0.35, and 0.50) ceramics have been investigated. XRD patterns confirms the formation of tetragonal phase with *P4mm* space group. The results indicate a strong influence of BCT substitution on the structural and electrical properties of $Ba_{0.9}Sr_{0.1}TiO_3$ (BST) ceramic. BST–BCT ceramic for x=0.35 have shown high dielectric constant εm~21 800, high remnant polarization *P*r~10.16 μC/cm2, large piezoelectric charge constant *D*33~293 pC/N, large piezoelectric voltage constant *g*33~5.80 mV·m/N, and highest dielectric breakdown strength *E*bd~224 kV/cm among the five synthesized samples. The correlation between structural, dielectric, ferroelectric, and piezoelectric properties of the BST ceramic with increasing BCT content have been systematically described on the basis of domain wall motion and grain size effect.

For details refer to https://dx.doi.org/10.1111/jace.15061

Improvement in Dielectric, Ferroelectric and Ferromagnetic Characteristics of $Ba_{0.9}Sr_{0.1}Zr_{0.1}Ti_{0.9}O_3$-$NiFe_2O_4$ Composites

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

Abstract: Multiferroic composites with the composition $(1-x)Ba_{0.9}Sr_{0.1}Zr_{0.1}Ti_{0.9}O_3$-$(x)NiFe_2O_4$($x$=0.0, 0.05, 0.10, 0.20 and 0.30) were prepared by mechano-chemical activation technique. Rietveld refined X-ray diffraction pattern shows the formation of individual perovskite (BSZT) and inverse spinel (NFO) phases for all the four composite samples. Microstructural investigation reveals that the inhomogeneity in grains increases with addition of NFO as compared to bare BSZT sample. Dielectric studies show that all the samples exhibit a well-defined ferroelectric to paraelectric transition peak. Further, the diffuseness of the samples increases as NFO content increases. Ferroelectric properties were found to be superior for $(1-x)$BSZT-(x)NFO sample with x=0.05 and decreases on further increase in NFO content. Dielectric breakdown strength also shows the similar trend as ferroelectricity and shows a maximum for x=0.05 ferrite (NFO) fraction. Magnetic measurement of BSZT-NFO composite samples shows a gradual increase in saturation magnetization and coercive field (H_c) with increasing NFO content.

For details refer to https://doi.org/10.1016/j.ceramint.2017.05.053

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Effect of In Situ Pyrolysis of Acetylene (C_2H_2) Gas as a Carbon Source on the Electrochemical Performance of $LiFePO_4$ for Rechargeable Lithium-ion Batteries

Rakesh Saroha and **Amrish K. Panwar***

Abstract: The intention of this work is to study the effect of in situ pyrolysis of acetylene (C_2H_2) gas used as a carbon source on the physicochemical and electrochemical performance of pristine $LiFePO_4$ (LFP). Acetylene gas, which decomposed to carbon and methane along with some side products when exposed to high temperature (>625 °C), is used as a carbon source for coating over the surface of LFP particles. Thermogravimetric (TGA) measurements were performed in an air atmosphere, primarily to estimate the exact amount of carbon deposited on the surface of the olivine cathode material due to the decomposition of C_2H_2 gas. Raman and TGA results confirm the presence of carbon as coated on the surface of the prepared compositions. Among all the synthesized samples, LFP with 10 min C_2H_2 treatment (LFPC10) shows the highest discharge capacity at all C-rates and exhibits excellent rate performance. LFPC10 delivers a specific discharge capacity of 144 (±5) mAh g^{-1} (~85% of the theoretical capacity of 170 mAh g^{-1}) at 0.1C rate. LFPC10 demonstrates the best cycling performance as it offers an initial discharge capacity of about 117 (±5) mAh g^{-1} (~69% of the theoretical capacity) at 1C-rate and has 97% capacity retention even after 100 charge/discharge cycles.

For details refer to https://doi.org/10.1088/1361-6463/aa708c

Development and Electrochemical Performances of $Li_3V_2(PO_4)_3$ and $Li_4Ti_5O_{12}$ Materials for Lithium Ion Battery

Rakesh Saroha, **Amrish K. Panwar***, Aditya Jain, Jitendra Singh and Sandeep Verma

Abstract: The development and electrochemical performances of $Li_3V_2(PO_4)_3$ cathode and $Li_4Ti_5O_{12}$ anode materials have been reported in this work using CR_{2032} coin half-cell as well as full cell testing. Physicochemical characterizations of both the materials were studied using X-ray diffraction and scanning electron microscopy. The XRD patterns reveal the formation of the pure phase for both the samples. SEM micrographs show the formation of micrometer size, irregular-shaped and heterogeneously dispersed grains for $Li_3V_2(PO_4)_3$ (LVP) sample while $Li_4Ti_5O_{12}$ (LTO) possesses nanometer size grains with nearly spherical morphology. Electrochemical tests reveal that the full cell made with mass/capacity balancing factor $\gamma = 1.64$ delivers better rate and cycling performances as compared to the full cell with $\gamma = 0.92$. The initial discharge capacity was obtained to be 92 $mAhg^{-1}$ at 0.1 C for the cell with $\gamma = 1.64$ and retained 100% capacity even after 30 charge/discharge cycles at the same rate.

For details refer to https://doi.org/10.1007/s11581-017-1984-2

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Synthesis and Electrochemical Characterization of Graphene Nanoflakes and $LiFe_{0.97}Ni_{0.03}PO_4/C$ for Lithium Ion Battery

Rakesh Saroha, **Amrish K. Panwar***, Akmal R. Farooq, Lucky Krishniya and P. K. Tyagi

Abstract: The graphene nanoflakes and olivine-type $LiFe_{0.97}Ni_{0.03}PO_4/C$ ($LFNP_3/C$) samples have been synthesized as anode and cathode materials, respectively. Physicochemical characterization of the graphene nanoflakes and $LFNP_3/C$ material were studied using X-ray diffraction (XRD) and scanning electron microscope (SEM). The XRD patterns reveal the formation of the pure phase of both the synthesized samples. SEM micrographs disclose the formation of spherically shaped nanosized particles for $LFNP_3/C$ while graphene shows flake-type morphology. CR_{2032} half and full coin cells were assembled for electrochemical testing of the synthesized samples. Cyclic voltammetry (CV) results indicate that the graphene-based half-cells, i.e., GN1H and GN2H, possess reduction peak/plateau around 0.17 V while $LFNP_3/C$ cathode shows discharging voltage plateau at 3.4 V vs. Li/Li^+. The discharge capacities were found to be 700, 900, and 153 $mAhg^{-1}$ for GN1H, GN2H, and $LFNP_3/C$ half-cells vs. Li/Li^+, respectively. Among full cells, LFPGN1F with $\gamma = 0.75$ (mass/capacity balancing factor) shows better charging/discharging profile at each C-rate as compared to LFPGN2F with $\gamma = 0.55$. LFPGN1F delivered an initial discharge capacity of around 154 $mAhg^{-1}$ at 0.1C and even at a high discharge rate of 1C, it retained ~97% of the discharge capacity as compared to the initial cycle at the same rate.

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Electrochemical Performances of Li-rich Layered-layered Li_2MnO_3-$LiMnO_2$ Solid Solutions as Cathode Material for Lithium-Ion Batteries

Rakesh Saroha, A.K. Gupta and **Amrish K. Panwar***

Abstract: In this work a series of Li-rich layered-layered solid solution of Li_2MnO_3-$LiMnO_2$[$Li[Li_{(1-x)}/3Mn_{(x+2)/3}]O_2$; x = 0.0, 0.1, 0.3 and 0.5] nanocomposite structure were successfully synthesized using sol-gel technique. All the synthesized compositions exhibit the main characteristics peaks of *m*-Li_2MnO_3 and could be indexed to the *C2/*m space group except some weak diffraction peaks located around 20–30° which can be attributed to the superlattice structure originate due to the ordering of Mn ion into Li-Mn layers and are typically observed for Li-rich based materials. CV results show that pristine LMO possesses weak anodic peak around 4.7 V and no symmetric cathodic peak in the voltage window of 2.0–4.8 V. Among all the synthesized compositions, x = 0.3 (LMO3) delivers highest specific discharge capacity and best rate and cycling performances at all values of current densities. The LMO3 composition delivers an initial discharge capacity of 177 ± 5 $mAhg^{-1}$ at a current density of 10 mA/g in the voltage range of 2.0–4.8 V and holds nearly 97% of the initial discharge capacity after 120 charge/discharge cycles at the same current density.

For details refer to https://doi.org/10.1016/j.jallcom.2016.11.199

Physicochemical and Electrochemical Performance of $LiFe_{1-x}Ni_xPO_4$ ($0 \leq x \leq 1.0$) Solid Solution as Potential Cathode Material for Rechargeable Lithium-ion Battery

Rakesh Saroha, **Amrish K. Panwar*** and Yogesh Sharma

Abstract: In this work, olivine-type $LiFePO_4$ (LFP) and nickel (Ni) substituted $LiFe_{1-x}Ni_xPO_4$ ($0 \leq x \leq 1.0$) solid solutions were synthesized using the wet-milling route. Synthesized samples were characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). XRD results show that all the samples were crystallized in the orthorhombic phase with Pnma space group and no secondary phase was detected even at higher Ni-concentration. Rietveld refinement results reveal that average distance increases up to x=0.03 (LFNP3) and decrease thereafter monotonically on further increase in Ni-concentration. Moreover, the LFNP3 sample shows highest electrical conductivity as compared to other solid solutions. Among the synthesized samples for $x \leq 0.1$, LFNP3 shows highest discharge capacity at all C-rates. LFNP3 exhibits a discharge capacity of 158 (±5) $mAhg^{-1}$ at 0.1 C (almost 93% of the theoretical capacity) and displays the high and stable discharge capacity of 145 (±5) $mAhg^{-1}$ at 1 C rate for 150 charge/discharge cycles. Among high Ni content ($0.1 < x \leq 1.0$) samples, $LiFe_{0.7}Ni_{0.3}PO_4$ (LFNP30) delivers best charge/discharge capacity at all C-rates. LFNP30 exhibits a discharge capacity of 90 (±5) $mAhg^{-1}$ at 0.1 C rate.

For details refer to https://doi.org/10.1016/j.ceramint.2017.01.115

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Effect of ZnO Doping on Structural, Dielectric, Ferroelectric and Piezoelectric Properties of $BaZr_{0.1}Ti_{0.9}O_3$ Ceramics

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

Abstract: This study provides a fundamental understanding of structural, dielectric, ferroelectric and piezoelectric properties of bare and ZnO-doped $BaZr_{0.1}Ti_{0.9}O_3$ (BZT) solid solutions synthesized using mechanochemical activation technique. Structural investigation has been carried out using XRD patterns of the synthesized compositions by Rietveld refinement method. It confirms the formation of tetragonal phase with *P4mm* space group for ZnO doping up to 2.5 wt%, while in 5.0 wt% ZnO-doped sample, BZT and ZnO are distributed as individual phases of tetragonal (*P4mm*) and hexagonal ($P6_3mc$), respectively. Microstructural analysis shows that average grain size increases quite rapidly with the increase of ZnO content. Detailed analysis of dielectric constant as a function of temperature for the prepared samples shows that the frequency independent dielectric constant maximum shifts to lower temperature with increase in ZnO doping. The ferroelectric ordering is confirmed using P-E loop measurements. The piezoelectric constant of the synthesized specimens were found to decrease with increasing ZnO content.

For details refer to https://doi.org/10.1016/j.ceramint.2016.10.157

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Development of Surface Functionalized ZnO-doped $LiFePO_4$/C Composites as Alternative Cathode Material for Lithium Ion Batteries

Rakesh Saroha, **Amrish K. Panwar***, Yogesh Sharma, Pawan K. Tyagi and Sudipto Ghosh

Abstract: Surface modified olivine-type $LiFePO_4$/C-ZnO doped samples were synthesized using sol-gel assisted ball-milling route. In this work, the influence of ZnO-doping on the physiochemical, electrochemical and surface properties such as charge separation at solid-liquid interphase, surface force gradient, surface/ionic conductivity of pristine $LiFePO_4$/C (LFP) has been investigated thoroughly. Synthesized samples were characterized using X-ray diffraction, scanning electron microscopy, atomic force microscopy, and transmission electron microscopy. All the synthesized samples were indexed to the orthorhombic phase with *Pnma* space group. Pristine LiFePO4 retain its structure for higher ZnO concentrations (i.e. 2.5 and 5.0 wt.% of LFP). Surface topography and surface force gradient measurements by EFM revealed that the kinetics of charge carriers, e^-/Li^+ is more in ZnO-doped LFP samples, which may be attributed to diffusion or conduction process of the charges present at the surface. Among all the synthesized samples LFP/C with 2.5 wt.% of ZnO (LFPZ2.5) displays the highest discharge capacity at all C-rates and exhibit excellent rate performance. LFPZ2.5 delivers a specific discharge capacity of 164 (±3) mAh g^{-1} at 0.1C rate. LFPZ2.5 shows best cycling performance as it provides a discharge capacity of 135 (±3) mAh g^{-1} at 1C rate and shows almost 95% capacity retention after 50 charge/discharge cycles. Energy density plot shows that LFPZ2.5 offers high energy and power density measured at high discharge rates (5C), proving its usability for hybrid vehicles application.

For details refer to https://doi.org/10.1016/j.apsusc.2016.09.105

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Biography

Prof. A.S. Rao

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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. He received his Master's and Doctoral degrees in Physics from S.K. University, Anantapur and S.V. University, Tirupati, Andhra Pradesh, respectively. He has a total of 25 years of teaching and research experience in his career. He received Young Physicist Award from Saha Institute of Nuclear Physics (SNIP), Kolkata, for his Ph.D. thesis presentation in 1993. He received three best teacher awards for three consecutive academic years from K L University, Vijayawada, Andhra Pradesh. He has guided 3 students for Doctoral degrees and currently guiding 8 students. He has handled nearly 0.88 crores worth of sponsored projects funded by ISRO and DST. Presently he has 0.90 crores worth of ongoing sponsored research projects funded by DST. His research interests are photoluminescence studies of rare earth doped glasses, phosphors and nanophosphors for photonic and bio-photonic applications; measurement of trace gases and aerosols to understand the radiation budget and global warming process. He has published 65 research papers in Scopus indexed International Journals and nearly 80 papers in national and international conferences. His h-index as reported by Google Scholar is 20.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	05

1. N. Deopa and **A.S. Rao**, "Photoluminescence and Energy Transfer Studies of Dy^{3+} Ions Doped LiPbAlB Glasses for w-LEDs and Laser Applications", *Journal of Luminescence*, vol.192, pp.832-841, 2017. Impact Factor: 2.686.

2. N. Deopa and **A.S. Rao**, "Spectroscopy Studies of Sm^{3+} Ions Doped LiPbAlB Glasses for Visible Luminescent Device Applications", *Optical Materials*, vol.72, pp.31-39, 2017. Impact Factor: 2.238.

3. N. Deopa, A.S. Rao, Sk. Mahamuda, M. Gupta, M. Jayasimhadri, D. Haranath and G.V. Prakash, "Spectroscopic Studies of Pr^{3+} Ions Doped LiPbAlB Glasses for Visible Reddish Orange Luminescent Device Applications", *Journal of Alloys and Compounds*, vol. 708, pp. 911-921, 2017. Impact Factor: 3.133.

4. S. Kaur, A.S. Rao, M. Jayasimhadri, "Spectroscopic and Photoluminescence Studies of Sm^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LED", *Ceramics International*, vol.43, pp.7401-7407, 2017. Impact Factor: 2.986.

5. Ch B. Annapurna Devi, Sk. Mahamuda, K. Swapna, M. Venkateswarlu, A.S. Rao and G.V.Prakash, "Compositional Dependence of Red Luminescence from Eu^{3+} Ions Doped Single and Mixed Alkali Fluoride Tungsten Tellurite Glasses, *Optical Materials*, vol.74, pp.260-267, 2017. Impact Factor: 2.238.

Photoluminescence and Energy Transfer Studies of Dy^{3+} Ions Doped Lithium Lead Alumino Borate Glasses for w-LED and Laser Applications

Nisha Deopa and **A.S. Rao***

Abstract: Lithium Lead Alumino Borate (LiPbAlB) glasses doped with Dy^{3+} ions with varying concentration were synthesized by using the melt quenching technique to understand their feasibility in solid state lighting and laser devices. From the absorption spectra, bonding parameters (δ) were evaluated to understand the nature of bonding between Dy^{3+} ions and its surrounding ligands. Judd-Ofelt intensity parameters estimated from the experimental oscillator strengths were used to evaluate various radiative parameters for the fluorescent levels of Dy^{3+} ions. From the decay curves, the experimental lifetimes were measured and coupled with the radiative lifetimes to evaluate the quantum efficiency. The decay profile changes from exponential to non-exponential with increase in Dy^{3+} ion concentration resulting decrease in experimental lifetimes. Inokuti-Hirayama model applied to the decay spectral profiles confirm dipole-dipole interaction responsible for their conversion from exponential to non-exponential. By exciting the glasses with different n-UV radiations, the CIE chromaticity coordinates and correlated color temperatures (CCT) were calculated to understand the utility of as-prepared glasses in cool white light generation. From the evaluated radiative parameters, CIE co-ordinates, CCT temperatures, emission cross-sections, quantum efficiency and confocal images, it was observed that LiPbAlB glass with 0.5 mol% Dy^{3+} ions are more suitable for the development of w-LEDs and Lasers.

For details refer to https://doi.org/10.1016/j.jlumin.2017.07.052

**Corresponding author.*

Spectroscopic Studies of Sm^{3+} Ions Activated Lithium Lead Alumino Borate Glasses for Visible Luminescent Device Applications

Nisha Deopa and **A.S. Rao***

Abstract: Photoluminescence (PL) characterization of Lithium Lead Alumino Borate (LiPbAlB) glasses doped with Sm^{3+} ions at varying concentrations have been studied by using absorption, excitation, emission, time resolved and confocal image measurements. From the absorption spectra, Judd-Ofelt (J-O) intensity parameters were evaluated and in turn used to estimate various radiative parameters for the fluorescent levels of Sm^{3+} ion doped LiPbAlB glasses. The PL spectra of Sm^{3+} ions exhibit three emission bands corresponding to the transitions $^4G_{5/2} \rightarrow {}^6H_{5/2}$, $^6H_{7/2}$ and $^6H_{9/2}$, for which the emission cross-sections and branching ratios were evaluated to know the potentialities of these materials as visible luminescent devices. The decay spectral profiles measured for $^4G_{5/2} \rightarrow {}^6H_{7/2}$ transition level were used to estimate quantum efficiency of the as-prepared glasses. The non-exponential decay curves observed for higher Sm^{3+} ion concentrations were well fitted to Inokuti-Hirayama model to understand the predominant energy transfer mechanism involved in the as-prepared glasses. CIE chromaticity coordinates and correlated color temperatures (CCT) were evaluated to understand the utility of the titled glasses in cool white light generation. The confocal images captured under 405 nm CW laser excitation show intense reddish-orange color. From the evaluated radiative parameters, emission cross-sections, quantum efficiency, CIE co-ordinates, CCT temperatures and confocal images, it was observed that LiPbAlB glass with 0.5 mol% Sm^{3+} ions are more suitable for w-LEDs and reddish-orange luminescent device applications.

For details refer to https://doi.org/10.1016/j.optmat.2017.04.067

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Spectroscopic Studies of $Pr3^{+}$ Doped Lithium Lead Alumino Borate Glasses for Visible Reddish Orange Luminescent Device Applications

Nisha Deopa, **A.S. Rao***, Sk. Mahamuda, Mohini Gupta, M. Jayasimhadri, D. Haranath and G. Vijaya Prakash

Abstract: Lithium Lead Alumino Borate (LiPbAlB) glasses doped with Pr^{3+} ions were prepared via melt quenching technique to study their luminescence behavior using absorption, excitation, photoluminescence (PL) and decay spectral studies. A broad hump observed in XRD confirms the amorphous nature of the as-prepared glass. The glass transition temperature (T_g) and thermal stability (ΔT) were measured from Differential Scanning Calorimetry (DSC). FT-IR and Raman studies were performed to understand the network functional groups involved in the host glass. Various radiative parameters for the prominent fluorescent levels of Pr^{3+} were evaluated with in the frame work of Judd-Ofelt theory. PL and confocal images recorded under 445 nm Continuous Wave (CW) diode laser excitation were used to understand the visible emission characteristic features of the as-prepared glasses. The decay profiles of $^1D_2 \rightarrow {}^3H_4$show single exponential for lower concentration and non-exponential for higher concentration resulting decrease in experimental lifetime (τ_{exp}) with increase in concentration. Such decrease in τ_{exp} and decay conversion from single to non-exponential with increase in rare earth ion concentration has been attributed to the cross-relaxation processes and subsequent concentration quenching observed. From the emission cross-sections, branching ratios, quantum efficiency, CIE coordinates and confocal images, it was concluded that 1 mol % Pr^{3+} ion concentration is optimum in LiPbAlB glasses to develop visible reddish orange luminescent devices.

For details refer to https://doi.org/10.1016/j.jallcom.2017.03.020

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Spectroscopic and Photoluminescence Characteristics of Sm^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LED

Sumandeep Kaur, **A.S. Rao*** and Mula Jayasimhadri

Abstract: Monophase Calcium Aluminozincate ($Ca_3Al_4ZnO_{10}$) phosphor doped with Sm^{3+} ions by varying concentrations have been prepared at 1300 °C using conventional solid state reaction technique. The crystal structure and phase analysis of the as-prepared phosphor has been carried out by X-ray Diffraction (XRD) studies. Morphology and functional groups present in the phosphor have been investigated thoroughly by using Scanning Electron Microscope (SEM) and Fourier Transform Infrared (FT-IR) spectral measurements, respectively. Under 401 nm excitation, the as-prepared phosphor exhibit intense visible orange emission at 601 nm. It has been observed that 1.0 mol% of Sm^{3+} ions concentration is optimum to give intense visible orange emission. The PL analysis reveals that the dipole-dipole interaction is primarily responsible for the concentration quenching observed beyond 1.0 mol% of Sm^{3+} ions. The TR-PL study reveals a bi-exponential behavior of decay curves with an average lifetime of the order of microseconds. The CIE coordinates (x=0.574 and y=0.424) measured for the optimized phosphor are very close to the intense orange emission coordinates specified by Nichia Corporation developed Amber LED NSPAR 70BS (0.570, 0.420). The spectroscopic, PL and TR-PL studies suggest the potential use of Sm^{3+} doped calcium aluminozincate phosphors for display and white light emitting devices.

For details refer to https://doi.org/10.1016/j.ceramint.2017.02.129

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Compositional Dependence of Red Luminescence from Eu^{3+} Ions Doped Single and Mixed Alkali Fluoro Tungsten Tellurite Glasses

Ch B. Annapurna Devi, SK. Mahamuda, Koneru Swapna, Mandalapu Venkateswarlu, **A. S. Rao*** and Gaddam Vijaya Prakash

Abstract: Trivalent europium ions doped single and mixed alkali fluoro tungsten tellurite glasses have been prepared via melt quenching method and characterized by using Raman, optical absorption, excitation, emission and time resolved spectral measurements to understand their utility in visible red emission. Raman spectrum is used to identify different functional groups present in the as prepared glasses. The optical absorption spectra recorded for all the glasses show six bands corresponding to the transitions $^7F_0 \rightarrow {}^6D_2$, $^7F_0 \rightarrow {}^6D_1$, $^7F_1 \rightarrow {}^6D_1$, $^7F_0 \rightarrow {}^6D_0$, $^7F_0 \rightarrow {}^7F_6$, and $^7F_1 \rightarrow {}^7F_6$. An excitation spectrum is used to measure the electron-phonon coupling strength 'g' and phonon energy of the glass host 'hω'. The photoluminescence (PL) spectra measured under 464 nm excitation show eight luminescence peaks related to the transitions $^5D_1 \rightarrow {}^7F_0$ (509 nm), $^5D_1 \rightarrow {}^7F_1$ (537 nm), $^5D_1 \rightarrow {}^7F_2$ (556 nm), $^5D_0 \rightarrow {}^7F_0$ (580 nm), $^5D_0 \rightarrow {}^7F_1$ (592 nm), $^5D_0 \rightarrow {}^7F_2$ (614 nm), $^5D_0 \rightarrow {}^7F_3$ (652 nm) and $^5D_0 \rightarrow {}^7F_4$ (701 nm) in all the glasses under investigation. Utilizing the Judd-Ofelt (J-O) parameters evaluated from the PL spectra, various radiative properties have been evaluated. From the decay spectra, experimental lifetimes were measured which are in turn used to evaluate the quantum efficiencies and non-radiatve decay rates in the as prepared glasses. The branching ratios, stimulated emission cross-section, quantum efficiency, colour co-ordinates and confocal images captured to confirm the suitability of these glasses for visible red luminescent devices

For details refer to https://doi.org/10.1016/j.optmat.2017.08.010

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Biography

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Dr. M. Jayasimhadri is an Assistant Professor in the Department of Applied Physics, Delhi Technological University, Delhi. He has more than 12 years of Teaching and Research experience. He did his Master's and Doctoral degree in Physics from Sri Venkateswara University (SVU), Tirupati, Andhra Pradesh, India. He had also 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 a Visiting Research Professor after joining in DTU. For his scientific work, he has received several awards and honors. To name a few, Young Scientist in Physical Sciences by SERB-DST, Government of India, FCT postdoctoral fellowship from Portuguese Government, Brain Korea (BK21) postdoctoral fellowship from South Korea Government, Junior Scientist of the Year by NESA, 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 Luminescent Devices. Dr. Jayasimhadri has published more than 75 research papers in reputed scientific journals. Besides these, the results of his research work presented in 95 International and National Conferences. His Research Citation Indices as reported by Google Scholar: h-index :25; i10-index: 48.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	05

1. K. Jha and **M. Jayasimhadri**, "Structural and Emission Properties of Eu^{3+}-doped Alkaline Earth Zinc-Phosphate Glasses for White LED Applications", *Journal of the American Ceramic Society*, vol. 100, no. 4, pp. 1402-1411, 2017. Impact Factor: 2.841.

2. **M. Jayasimhadri**, K. Jha, B.V. Ratnam, H.J. Woo, K. Jang, A. S. Rao and D. Haranath, "Single NUV Band Pumped PbO-GeO_2-TeO_2: Tb^{3+} Yellowish Green Emitting Glass Material for Tricolor White LEDs", *Journal of Alloys and Compounds*, vol. 711, pp. 395-399, 2017. Impact Factor: 3.133.

3. K. Jha, A.K. Vishwakarma, M. Jayasimhadri and D. Haranath, D, "Multicolor and White Light Emitting Tb^{3+}/Sm^{3+} Co-doped Zinc Phosphate Barium Titanate Glasses via Energy Transfer for Optoelectronic Device Applications", *Journal of Alloys and Compounds*, vol. 719, pp. 116-124, 2017. Impact Factor: 3.133.

4. S. Kaur, M. Jayasimhadri and A.S. Rao, "A Novel Red Emitting Eu^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LEDs", *Journal of Alloys and Compounds*, vol. 697, pp. 367-373, 2017. Impact Factor: 3.133.

5. B.V. Ratnam, M.K. Sahu, A.K. Vishwakarma, K. Jha, H.J. Woo, K. Jang and M. Jayasimhadri, "Optimization of Synthesis Technique and Luminescent Properties in Eu^{3+}-activated $NaCaPO_4$ Phosphor for Solid State Lighting Applications", *Journal of Luminescence*, vol. 185, pp. 99-105, 2017. Impact Factor: 2.686.

Structural and Emission Properties of Eu^{3+}-doped Alkaline Earth Zinc-phosphate Glasses for White LED Applications

Kaushal Jha and **Mula Jayasimhadri***

Abstract: Quaternary alkaline earth zinc-phosphate glasses in molar composition $(40 - x)ZnO - 35P_2O_5 - 20RO - 5TiO_2 - xEu_2O_3$ (where x=1 and R=Mg, Ca, Sr, and Ba) were prepared by melt quenching technique. These glasses were studied with respect to their thermal, structural, and photoluminescent properties. The maximum value of the glass transition temperature (T_g) was observed for BaO network modifier mixed glass and minimum was observed for MgO network modifier glass. All the glasses were found to be amorphous in nature. The FT-IR suggested the glasses to be in pyrophosphate structure, which matches with the theoretical estimation of O/P atomic ratio and the maximum depolymerization was observed for glass mixed with BaO network modifier. The intense emission peak was observed at 613 nm ($^5D_0 \rightarrow {}^7F_2$) under excitation of 392 nm, which matches well with excitation of commercial *n*-UV LED chips. The highest emission intensity and quantum efficiency was observed for the glass mixed with BaO network modifier. Based on these results, another set of glass samples was prepared with molar composition $(40 - x)$ $ZnO - 35P_2O_5 - 20BaO - 5TiO_2 - xEu_2O_3$($x$=3, 5, 7, and 9) to investigate the optimized emission intensity in these glasses. The glasses exhibited crystalline features along with amorphous nature and a drastic variation in asymmetric ratio at higher concentration (7 and 9 mol%) of Eu_2O_3. The color of emission also shifted from red to reddish orange with increase in the concentration of Eu_2O_3. These glasses are potential candidates to use as a red photoluminsecent component in the field of solid-state lighting devices.

For details refer to https://doi.org/10.1111/jace.14668

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Single NUV Band Pumped PbO-GeO_2-TeO_2:Tb^{3+} Yellowish Green Emitting Glass Material for Tricolor White LEDs

Mula Jayasimhadri, Kaushal Jha, B.V. Ratnam, Hyun-Joo Woo, Kiwan Jang, A.S. Rao and D. Haranath

Abstract: In this work, Tb^{3+} ions doped lead-germanate-tellurite (LGT) glasses were prepared by conventional melt quenching technique with different dopant concentrations ranging from 0.5 to 3.5 mol %. X-ray diffraction (XRD) and FT-IR analysis were carried out to analyze the structural properties of LGT glass. The excitation spectra revealed a single band centered in the NUV region at 380 nm by monitoring emission at 545 nm. The emission spectra consist of four bands, which are attributed to the $^5D_4 \rightarrow {}^7F_J$ (J = 3–6) transitions. Among these transitions, the strong emission band was observed at 545 nm corresponding to the $^5D_4 \rightarrow {}^7F_5$ transition and the optimized doping concentration of Tb^{3+} ions was 2 mol %. The Huang›s theory and I-H model indicate the possibility of energy transfer via electric dipole-dipole interaction between Tb^{3+} ions. The CIE chromaticity coordinates were (x = 0.282 and y = 0.614) and emits intense yellowish green light. The decay curves measured for $^5D_4$ level for the samples with different doping concentrations and the lifetime for the optimized sample was 548 μs. The results indicate that these glasses have potential applications in solid state lighting and display devices.

For details refer to https://doi.org/10.1016/j.jallcom.2017.03.252

Multicolor and White Light Emitting Tb^{3+}/Sm^{3+} Doped Zinc Phosphate Barium Titanate Glasses via Energy Transfer for Optoelectronic Device Applications

Kaushal Jha, Amit K. Vishwakarma, **Mula Jayasimhadri*** and D. Haranath

Abstract: A series of Tb^{3+}/Sm^{3+} co-doped ZPBT glasses have been successfully prepared via melt quenching technique and their photoluminescence properties and energy transfer mechanism were investigated. Tb^{3+} doped glass exhibits dominant emission peak at 544 nm corresponding to $^5D_4 \rightarrow {}^7F_5$ transition under 375 nm excitation whereas Sm^{3+}doped glass exhibits intense emission peak at 599 nm corresponding to $^4G_{5/2} \rightarrow {}^6H_{7/2}$ under 399 nm excitation. The CIE chromaticity coordinates (0.259, 0.590) and (0.570, 0.428) are located in the pure green and orange region for $Tb^{3+}$and Sm^{3+} doped glasses, respectively. The Tb^{3+}/Sm^{3+} co-doped glasses under 375 nm excitation emit a combination of blue, green and orange-red light while under 484 nm excitation emits green and red-orange emission light. The energy transfer occurs from Tb^{3+} to Sm^{3+} via dipole-dipole interaction, which was confirmed by applying Dexter and Reisfeld›s theory and Inokuti Hirayama (I-H) model. Moreover, the energy transfer efficiencies and probabilities were calculated from the decay curves. The color tone of these glasses can be modulated from yellowish-green to warm-white via greenish-yellow by appropriate tuning of Sm^{3+} concentrations and excitation wavelengths. These results indicate that the prepared glasses can be a potential candidate for white light as well as solid state lighting applications.

For details refer to https://doi.org/10.1016/j.jallcom.2017.05.076

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A Novel Red Emitting Eu^{3+} Doped Calcium Aluminozincate Phosphor for Applications in w-LEDs

Sumandeep Kaur, **Mula Jayasimhadri*** and A.S. Rao

Abstract: A novel calcium aluminozincate phosphor doped with Eu^{3+} ions has been synthesized by conventional solid state reaction method and characterized by using X-ray diffraction (XRD), Scanning Electron Microscope (SEM), Diffuse Reflectance Absorbance (DRA) and Spectrofluorophotometer to study the structural, morphological and photoluminescence (PL) properties. All the XRD peaks are matching well with the standard ICDD card confirm that the prepared phosphors consist of single phase orthorhombic structure ($Ca_3Al_4ZnO_{10}$) having Pbc2 space group. The PL spectra recorded under near-UV/blue excitations demonstrates a very distinct and intense red emission from all the phosphors. In the present investigation, we found that 2 mol% of Eu^{3+} ions concentration is optimum in this host to give intense red emission. This result is also in consistent with the CIE chromaticity coordinates measured from the PL spectra of the samples under investigation. The results obtained for the optimized phosphor in the present investigation such as PL and CIE coordinates (x = 0.629 and y = 0.370) are close to the commercial red phosphor Y_2O_2S: Eu^{3+} (x = 0.622 and y = 0.351) and also very near to the coordinates specified by National Television Standard Committee (NTSC).

For details refer to https://doi.org/10.1016/j.jallcom.2016.12.150

Optimization of Synthesis Technique and Luminescent Properties in Eu^{3+}-activated NaCaPO4 Phosphor for Solid State Lighting Applications

B.V. Ratnam, Mukesh K.Sahu, Amit K. Vishwakarma, Kaushal Jha, Hyun-JooWoo, Kiwan Jang and **Mula Jayasimhadri***

Abstract: Europium activated $NaCaPO_4$ phosphor has been synthesized by various synthesis techniques such as solid-state reaction (SSR), molten salt synthesis (MSS) and sol-gel combustion (SGC) method to optimize the synthesis procedure. The comparative investigations of structural and luminescent properties have been studied to know the best synthesis method. The XRD patterns and Rietveld refinement analysis of the synthesized phosphors confirmed the single phase orthorhombic structure of $NaCaPO_4$. Excitation spectra indicate the strong absorption in near ultraviolet (n-UV) region and the emission spectra exhibit strong emission band at 595 nm corresponds to $^5D_0 \rightarrow {}^7F_1$ transition under n-UV (λ_{ex}=392 nm) excitation. The SGC route synthesized phosphor exhibit intense emission than that of the SSR and MSS method. Therefore, the effect of dopant (Eu^{3+}) concentration on the emission intensity and concentration quenching mechanism has been discussed in detail for the Eu^{3+}doped $NaCaPO_4$ phosphor synthesized by SGC method. The CIE chromaticity coordinates have been calculated for the phosphors synthesized by SSR, MSS and SGC methods to reveal the emitting color and also to know the utility of this phosphor for white LEDs.

For details refer to https://doi.org/10.1016/j.jlumin.2017.01.006

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Dr. Mohan Singh Mehata received his Ph.D. from Kumaun University, U.K. Subsequently, he received visiting fellowship of Michigan Technological University, USA (2003), DST-Young Scientist Fellowship (2004-07), COE and JST-Postdoctoral Fellowships, Hokkaido University, Japan (2004-05, 07), UCOST-Young Scientist award (2007), Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship (2007-09), Carnegie Mellon University Research Associateship (2009-10) and Chinese Academy of Science (CAS) Visiting Professorship (2014-15). He is author and co-author of more than 80 research papers and conference proceedings including six as single author and two in NPG journals. He received about 2 crore rupees funding for research from various funding agencies, DST (2004), DAE-BRNS (2012), SERB (2016) and DST (2017). He has supervised about fifteen M.Tech and one Ph.D. students. He is a member of editorial board of several journals. He has delivered 13 invited talks and participated in 40 International/National conferences. He has about 22 years of research and teaching experience. Dr. Mehata is working as Assistant Professor of Engineering Physics at the Department of Applied Physics, DTU. His current research interest is to develop and explore semiconductor/metal nanoparticles/quantum dots/molecules/polymers with a view of their applications as optical sensors, bio-imaging, and optoelectronic devices, and also to investigate charge/energy/proton transfer mechanism.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. R. K. Ratnesh and **M.S. Mehata**, "Investigation of Biocompatible and Protein Sensitive Highly Luminescent Quantum dots/nanocrystals of CdSe, CdSe/ZnS and CdSe/CdS", *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, vol. 179, pp. 201-210, 2017. Impact Factor: 2.098.

2. R. K. Ratnesh and **M.S. Mehata**, "Synthesis and Optical Properties of Core-multi-shell CdSe/CdS/ZnS Quantum Dots: Surface Modifications", *Optical Materials*, vol. 64, pp. 250-256, 2017. Impact Factor: 2.023.

3. **M.S. Mehata**, A.K. Singh and R.K. Sinha, "Investigation of Charge-separation/change in Dipole Moment of 7-azaindole: Quantitative Measurement using Solvatochromic Shifts and Computational Approaches", *Journal of Molecular Liquids*, vol. 231, pp. 39-44, 2017. Impact Factor: 3.648.

Investigation of Biocompatible and Protein Sensitive Highly Luminescent Quantum dots/nanocrystals of CdSe, CdSe/ZnS and CdSe/CdS

R.K. Ratnesh and **Mohan Singh Mehata***

Abstract: The size and shape dependent semiconductor quantum dots (0D nanoparticles) with color tunability demonstrating significant influence in a biological system and considered as ideal probes. Here, a non-coordinated colloidal approach was used for the synthesis of CdSe, CdSe/ZnS and CdSe/CdS core-shell quantum dots (QDs) of 3-4nm. The synthesized nanocrystals show a high crystallinity, examined by X-ray diffraction (XRD) and high-resolution electron microscopy (HRTEM). The core-shell semiconductor QDs exhibit stronger photoluminescence (PL) as compared to the core QDs. The strong PL with small full-width half maximum (FWHM) indicates that the prepared QDs have a nearly uniform size distribution and well dispersibility. The quantum yield (QY) of core-shell QDs increases due to the surface passivation. Further, the PL of BSA is quenched strongly by the presence of core-shell QDs and follows the well-known Stern-Volmer (S-V) relation, whereas the PL lifetime does not follow the S-V relation, demonstrating that the observed quenching is predominantly static in nature. Among CdSe core, CdSe/ZnS and CdSe/CdS core-shell QDs, the CdSe/ZnS QDs shows the least cytotoxicity and most biocompatibility. Thus, the prepared core-shell QDs are biocompatible and exhibit strong sensing ability.

For details refer to https://doi.org/10.1016/j.saa.2017.02.028

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Synthesis and Optical Properties of Core-multi-shell CdSe/CdS/ZnS Quantum Dots: Surface Modifications

R.K. Ratnesh and **Mohan Singh Mehata***

Abstract: We report two port synthesis of CdSe/CdS/ZnS core-multi-shell quantum dots (Q-dots) and their structural properties. The multi-shell structures of Q-dots were developed by using successive ionic layer adsorption and reaction (SILAR) technique. The obtained Q-dots show high crystallinity with the step-wise adjustment of lattice parameters in the radial direction. The size of the core and core-shell Q-dots estimated by transmission electron microscopy images and absorption spectra is about 3.4 and 5.3 nm, respectively. The water soluble Q-dots (scheme-1) were prepared by using ligand exchange method, and the effect of pH was discussed regarding the variation of quantum yield (QY). The decrease of a lifetime of core-multi-shell Q-dots with respect to core CdSe indicates that the shell growth may be tuned by the lifetimes. Thus, the study clearly demonstrates that the core-shell approach can be used to substantially improve the optical properties of Q-dots desired for various applications.

For details refer to https://doi.org/10.1016/j.optmat.2016.11.043

Investigation of Charge-separation/change in Dipole Moment of 7-azaindole: Quantitative Measurement using Solvatochromic Shifts and Computational Approaches

Mohan Singh Mehata*, Ajay K. Singh and Ravindra Kumar Sinha

Abstract: Solvatochromic and computational approaches were applied to 7-azaindole (7-AI). The vertical transitions together with the bright singlet states and HOMO-LUMO were obtained from the DFT/TDDFT quantum chemical calculations. The ground and excited electronic states dipole moments hence the change in the dipole moment were investigated by measuring the steady-state absorption and fluorescence spectra in various solvents and by using DFT/TDDFT calculations. The dipole moment in the photo-excited state is significantly larger than the ground state, as obtained both experimentally and theoretically. The higher values of excited state dipole moment than the ground state dipole moment demonstrating a significant charge separation in the photo-excited state of 7-AI, which in turn depends on the solvent polarity and hydrogen bonding ability. Also, the nearly linear relation observed between the fluorescence maximum/Stokes shift and solvent polarity indicates sensing ability of 7-AI towards organic solvents. The present study is important for understanding charge transfer/proton transfer mechanism of DNA base pairs.

For details refer to https://doi.org/10.1016/j.molliq.2017.01.091

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Biography

Dr. Nitin Kumar Puri

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Dr. Nitin Kumar Puri is an Assistant Professor in Department of Applied Physics, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. He received his doctorate degree from Cyclotron Laboratory, Panjab University, Chandigarh. He has worked in HongHua Company Limited, China for Research and Development (R&D) field. He has been Chairman and Vice Chairman of Working Group-III of International Nuclear Security on Education Network at International Atomic Energy Agency (IAEA), Vienna, Austria. He has been awarded four (4) research projects of nearly Rs.1 Crore from different funding agencies viz: DST, BRNS, UGC-DAE, Govt. of India. His research interests are Sensors, Biosensors, Nanotechnology, Accelerator based Atomic Physics, Ion beam Modification of Materials etc. He has presented and published 90 research papers in international journals and conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. D. Sandil, S. Kumar, K. Arora, S. Srivastava, B.D. Malhotra, S.C. Sharma and **N. K. Puri**, "Biofunctionalized Nanostructured Tungsten Trioxide based Sensor for Cardiac Biomarker Detection", *Materials Letters*, vol. 186, pp. 202-205, 2017. Impact Factor: 2.572.

2. G. Sharma, **N. K. Puri** and T. Nandi, "Theoretical Approach for Detection and Lifetime Measurement of Obscured Low Cross-sectional Processes by the X-ray Absorption Technique", *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, vol. 408, pp. 289-293, 2017. Impact Factor: 1.109.

3. G. Sharma, **N. K. Puri** and T. Nandi, "Lifetime Quenching due to Surface Wake Field", *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, vol. 408, pp. 178-181, 2017. Impact Factor: 1.109.

Biofunctionalized Nanostructured Tungsten Trioxide Based Sensor for Cardiac Biomarker Detection

Deepika Sandil, Saurabh Kumar, Kamal Arora, Saurabh Srivastava, B.D. Malhotra, Suresh C. Sharma and **Nitin K. Puri***

Abstract: We report results of the studies relating to the technological development of 3-aminopropyl tri-ethoxy saline (APTES) conjugated tungsten trioxide nanoparticles (APTES/n-WO_3) based sensor for cardiac Troponin I (cTnI) detection. The APTES/n-WO_3 nanoparticles were deposited onto indium tin oxide (ITO) coated glass electrode via electrophoretic deposition technique and were subsequently functionalized with troponin antibodies (anti-cTnI). The n-WO_3/ITO and anti-cTnI/APTES/n-WO_3/ITO electrodes were characterized using X-ray diffraction (XRD), UV–vis spectroscopy, Fourier transform infrared (FT-IR) spectroscopy, atomic force microscopy (AFM) and electrochemical impedance spectroscopy (EIS) respectively. This immunosensor exhibited a wider linear detection range (1–250 ng mL^{-1}) with good sensitivity (26.56 Ω $ng^{-1}mL\ cm^{-2}$).

For details refer to https://doi.org/10.1016/j.matlet.2016.09.107

Theoretical Approach for Detection and Lifetime Measurement of Obscured Low Cross-sectional Processes by the X-ray Absorption Technique

Gaurav Sharma, **Nitin K. Puri*** and T. Nandi

Abstract: The X-ray absorption spectroscopy technique has been discussed for resolving the low-intensity peaks obscured in the neighborhood of the closely spaced peaks and eliminating the pile-up effect, simultaneously. A theoretical comparison of the absorption technique with the available pile-up rejecters reveals better efficiency for the detection of the higher energy X-ray lines. The technique does not change the fundamental characteristics of the peaks and therefore can be employed to measure the lifetimes of the corresponding states and absolute cross sections. The lifetime of a state calculated with this technique is found to be the same as that without attenuating the intensity using any absorber.

For details refer to https://doi.org/10.1016/j.nimb.2017.05.062

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Lifetime Quenching due to Surface Wake Field

Gaurav Sharma, **Nitin K. Puri*** and T. Nandi

Abstract: We report the measurement of surface wakefield on the lifetime of He-like Ti ($1s2s\ ^3S_1$) during the time-of-flight measurements in the beam-foil experiment. Quenching in the lifetime of $1s2s\ ^3S_1$ state from 26.6 ns to 67.11 ps has been observed due to blending with short-lived $1s2p\ ^3P_1^o$ states in the presence of wakefield present near the target surface. The measured and theoretical lifetime of unperturbed He-like Ti ($1s2s\ ^3S_1$) and ($1s2p\ ^3P_1^o$) has been used to calculate the blending parameter ε (3.74×10^{-2}). The surface wakefield for 110 MeV Ti^{+8} passing through 80 μg/cm^{2}thick carbon foil is found to be 9.15×10^7 V/cm. The measured stark mixing parameter can be used to determine the surface wakefield as well as the wake stopping power of an ion through a solid target.

For details refer to https://doi.org/10.1016/j.nimb.2017.05.063

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Biography

Dr. Pawan Kumar Tyagi

Department of Applied Physics

Dr. Pawan Kumar Tyagi is currently serves 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 12.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	07

1. K. Patel and **P. K. Tyagi**, "Optical Effective Mass of Photon in Single and Bilayer Graphene in 10 MHz-26.5 GHz Frequency Range", *Carbon*, vol. 121, pp. 56-62, 2017. Impact Factor: 6.637.

2. R. Kumari, A. Singh, B. S. Yadav, D. R. Mohapatra, A. Ghosh, P. Guha, P.V. Satyam, M. K. Singh and **P K. Tyagi**, "Filled-carbon Nanotubes: 1 D Nanomagnets Possessing Uniaxial Magnetization Axis and Reversal Magnetization Switching", *Carbon*, vol. 119, pp. 464-475, 2017. Impact Factor: 6.637.

3. K. Patel and **P. K. Tyagi**, "P-type Multilayer Graphene as a Highly Efficient Transparent Conducting Electrode in Silicon Heterojunction Solar Cells", *Carbon*, vol. 116, pp. 744-752, 2017. Impact Factor: 6.637.

4. K. Patel and **P. K. Tyagi**, "Single Layer Graphene Possessing Anomalous Dispersion with Exotic Microwave Transmission and Dielectric Properties", *Journal of Alloys and Compounds*, vol. 706, pp. 250-259, 2017. Impact Factor: 3.133.

5. A. Singh, P. Guha, A.K. Panwar and **P.K. Tyagi**, "Estimation of Intrinsic Work Function of Multilayer Graphene by Probing with Electrostatic Force Microscopy, *Applied Surface Science*, vol. 402, pp. 271-276, 2017. Impact Factor: 3.387.

6. R. Kumari, F. Singh, B.S. Yadav, R.K. Kontala, K.R. Peta, **P.K. Tyagi**, S. Kumar and N.K. Puri, "Ion Irradiation Induced Localized sp^2 to sp^3 Hybridized Carbon Transformation in Walls of Multiwalled Carbon Nanotubes", *Nuclear Instruments and Methods in Physics Research B*, vol. 412, pp. 115-122, 2017. Impact Factor: 1.109.

7. P. Tiwari, K. Patel, L. Krishnia, R. Kumari and **P.K. Tyagi**, "Potential Application of Multilayer n-type Tungsten Diselenide (WSe_2) Sheet as Transparent Conducting Electrode in Silicon Heterojunction Solar Cell", *Computational Materials Science*, vol. 136, pp. 102–108, 2017. Impact Factor: 2.292.

Optical Effective Mass of Photon in Single and Bilayer Graphene in 10 MHz–26.5 GHz Frequency

Kamlesh Patel and **Pawan K. Tyagi***

Abstract: The present study has been carried out to experimentally determine the optical effective mass of photon in single layer graphene transferred on glass and quartz substrates, and bilayer graphene as-grown on Cu foil. Measurements have been performed in microstrip line based test fixture where first real and imaginary parts of complex relative permittivity have been obtained, then the refractive index is used to estimate the phase velocity in single and bilayer graphene, this index were found to be higher at lower frequency below 1.5 GHz. The phase velocities are found to be ~ 1.04×10^8 ms^{-1} and ~ 1.11×10^8 ms^{-1} in single and bilayer graphene, respectively and little high group velocities are found in range of 2–26.5 GHz. In single and bilayer graphene, the optical effective mass has been found to vary from ~ 0.72×10^{-10} m_0 to ~ 0.2×10^{-8} m_0 in a frequency range between 1 and 26.5 GHz. We envision that reported results can help to understand the transport behaviour of photons in as-grown graphene layer in microwave frequency range.

For details refer to https://doi.org/10.1016/j.carbon.2017.05.057

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Filled-carbon Nanotubes: 1 D Nanomagnets Possessing Uniaxial Magnetization Axis and Reversal Magnetization Switching

Reetu Kumari, Anshika Singh, Brajesh S. Yadav, Dipti Ranjan Mohapatra, Arnab Ghosh, Puspendu Guha, P V Satyam, Manoj Kumar Singh and **Pawan K Tyagi***

Abstract: The present study aims to control the direction of magnetization in Fe_3C, Co and Ni nanorods filled inside carbon nanotube (CNT). This control has been achieved during growth by modifying thermal chemical vapor deposition (CVD) system. As-grown *in situ* filled-CNTs were found to exhibit permanent magnetization. These CNTs have been characterized by using scanning electron microscopy (SEM), X-ray diffraction, Raman spectroscopy and transmission electron microscopy (TEM). Afterwards, direction of magnetization in Fe_3C, Co or Ni nanorod filled inside CNT has been further probed by using magnetic force microscopy (MFM). MFM measurements reveal that nanorod exhibits single domain behavior and direction of magnetization, instead of being controlled either by shape or magneto crystalline anisotropy, has been found to be influenced by magnetic field gradient, produced in modified thermal CVD system. Direction of magnetization has been found either along tube axis in vertical grown CNTs or in radial direction i.e. perpendicular to the tube axis in randomly grown CNTs. Besides investigated structural and magnetic properties, plausible growth model of *in situ* filling as well as mechanism to understand unique magnetization behavior has been proposed.

For details refer to https://doi.org/10.1016/j.carbon.2017.04.053

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P-type Multilayer Graphene as a Highly Efficient Transparent Conducting Electrode in Silicon Heterojunction Solar Cells

Kamlesh Patel and **Pawan K. Tyagi***

Abstract: In this paper, we have simulated the structure of a p-graphene/n-crystalline silicon solar cell by using AFORS-HET software. Following our recent report (Patel and Tyagi, AIP Adv. 5 (2015) 077165) here also we have considered graphene as 3D in nature. To obtain confinement, boundary conditions have been applied by controlling number of layers. Formation of Schottky junction has been ensured by making of electrical contact along the c-axis to collect the minority carriers. Power conversion efficiency of 6.75 % has been achieved with best-simulated cell's parameters of p-type single layer graphene. Under the illumination conditions of AM1.5G, it has been observed that as layer number increases up to 20 efficiency decreases linearly to 4.34 %. Through the optimization of parameters of n-crystalline silicon layer, a maximum efficiency of 9.812 % has been achieved for 80 μm thick silicon. Such heterojunction photovoltaic device has shown large temperature dependence. Cell performance has been further tested taking parameters of commercial available n-type Si. Optimum efficiency of 11.47 % has been achieved for 100 μm thick silicon layer. Finally, we have demonstrated that p-type multilayer graphene can act as an efficient transparent conducting electrode.

For details refer to https://doi.org/10.1016/j.carbon.2017.02.042

Single Layer Graphene Possessing Anomalous Dispersion with Exotic Microwave Transmission and Dielectric Properties

Kamlesh Patel and **Pawan K. Tyagi***

Abstract: The present study aims to experimentally deduce the transmission and dielectric properties of CVD-grown single layer graphene transferred on glass and quartz substrates in wide frequency range from 100 MHz to 10 GHz. First, structural properties of graphene layer have been probed by Raman spectroscopy and then a simple and straightforward de-embedding method based on the propagation constants is adopted to deduce the effective relative permittivity of graphene layer. The graphene layer deposited on the substrate is found to exhibit higher absorption than the bare glass as well as quartz substrate in range of 2–10 GHz. The phase and group velocities have been determined and found to be in well agreement with values obtained by using the standard de-embedding method based on ABCD parameters. In both cases, graphene on glass and quartz, the maximum values of phase velocity are found to be ~8.57×10^7 m/s at 4.12 GHz and ~9.13×10^7 m/s at 4.52 GHz, respectively whereas the respective maximum group velocities for these materials are found to be ~2.0×10^9 m/s and ~1.9×10^9 m/s at 817 MHz.

For details refer to https://doi.org/10.1016/j.jallcom.2017.02.184

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Estimation of Intrinsic Work Function of Multilayer Graphene by Probing with Electrostatic Force Microscopy

Anshika Singh, Puspendu Guha, Amrish K. Panwar and **Pawan K. Tyagi***

Abstract: In present study, electrostatic force microscopy (EFM) is used to estimate the intrinsic work function of few layer graphene (FLG) transferred on SiO_2 (300 nm)/ Si (500 μm) substrate. This FLG has been prepared by using the mechanical exfoliation technique. In exfoliated FLG, adhesive residues are always left from scotch tape on its surface. These residues as well as SiO_2 substrate could modify the work function due to the formation of dipoles on the surface. Taking the effect of adhesive into account, FLG is pre-charged and then scanned with a tip biased with dc voltage. Intrinsic work function of FLG is determined and found to be 4.52 ± 0.1 eV.

For details refer to https://doi.org/10.1016/j.apsusc.2017.01.047

Ion Irradiation-induced, Localized sp^2 to sp^3 Hybridized Carbon Transformation in Walls of Multiwalled Carbon Nanotubes

Reetu Kumari, Fouran Singh, Brajesh S. Yadav, Ravinder K. Kotnala, Koteswara Rao Peta, **Pawan K. Tyagi***, Sanjeev Kumar and Nitin K. Puri

Abstract: In this report, ion irradiation-induced localized sp^2 to sp^3 hybridized carbon transformation in multiwalled carbon nanotubes (MWCNTs) was observed after irradiating MWCNTs with high-energy Au^{+8} ions (100 MeV). The used MWCNTs were grown using cobaltocene and benzene as catalyst and carbon source, respectively by the thermal CVD technique and consist of both unfilled and Co-filled tubes. Prior to irradiation, the MWCNT sample was characterized using scanning electron microscope and micro-Raman and photoluminescence spectrometers. The effect of ion fluence on MWCNT walls and transformation of sp^2 to sp^3 sites was analyzed by Raman spectroscopy, X-ray photoelectron spectroscopy, and high-resolution transmission electron microscopy. We found that as the fluence increased, the localized transformation from sp^2 to sp^3 sites occurred in the walls of MWCNTs, which was evident by the emergence of peak at approximately 1543 cm^{-1} associated with the G peak in tetrahedral amorphous carbon (ta-C) and the vanishing of 2D band (2700 cm^{-1}). Furthermore, we observed broadening in D and G, with slight shift in their positions and consistent decrease in 2D band intensity, as fluence increased.

For details refer to https://doi.org/10.1016/j.nimb.2017.09.019

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Potential Application of Multilayer n-type Tungsten Diselenide (WSe_2) Sheet as Transparent Conducting Electrode in Silicon Heterojunction Solar Cell

Pranjala Tiwari, Kamlesh Patel, Lucky Krishnia, Reetu Kumari and **Pawan K. Tyagi***

Abstract: In this paper, structure of n-type WSe_2/p-type Si heterojunction solar cell has been simulated by using AFORS-HET software version 2.5 at AM1.5. In order to get maximum power conversion efficiency (PCE), parameters of both tri-layer tungsten diselenide (WSe_2) and Si have been optimized. In the present study, tri-layer WSe_2 has been considered as 3-D in nature instead of the reported 2-D nature. After optimizing the parameters of both tri-layer WSe_2 and silicon wafer, PCE of nearly 13.09 % has been achieved which decreases to 8.9 % as number of layers of WSe_2 increases from 3 to 40. Furthermore, maximum value PCE has been found to be 6.8 % when parameters of commercial available silicon wafer were taken for simulation. We have also analyzed the effect of temperature as well as the spectral response in order to make the best optimized solar cell. In the present work, we have demonstrated that n-type tri-layered WSe_2 has an immense potential to be used as an excellent transparent conducting electrode.

For details refer to https://doi.org/10.1016/j.commatsci.2017.04.026

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Biography

Dr. Rishu Chaujar

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Dr. Rishu Chaujar is an Assistant Professor in the discipline of Engineering Physics, Department of Applied Physics, Delhi Technological University, India. She is M.Sc. Electronics (Gold Medalist) and Ph.D(Electronics) from Delhi University in 2005 and 2009 respectively and received Shanti Devi Bhargava Memorial Medal (2006) for excellence in academics in M.Sc. Electronics. Her research interests involve modeling, design and simulation of Sub-100nm gate engineered Grooved Gate/Concave MOSFET, Nanowires, Tunnel FETs, HEMTs and Solar Cells. She has authored or co-authored more than 200 papers in various reputed international and national journals and conferences. She is also the Principal Investigator of DST Fast Track Young Scientist Research Project on Silicon Nanowire Transistors. 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. Dr. Chaujar is a Fellow of IETE, Senior Member of IEEE and a Life Member of NASI.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01
Commendable Research Award	07

1. J. Madan and **R. Chaujar**, "Numerical Simulation of N+ Source Pocket PIN-GAA - Tunnel FET: Impact of Interface Trap Charges and Temperature Affectability", *IEEE Transactions on Electron Devices*, vol. 64, pp. 1482-1488, 2017. Impact Factor: 2.605.

2. N. Gupta and **R. Chaujar**, "Quantum Analysis Based Extraction of Frequency Dependent Intrinsic and Extrinsic Parameters for GEWE-SiNW MOSFET", *Journal of Computation Electronics*, vol. 16, no. 1, pp.61-73, 2017. Impact Factor: 1.526.

3. J. Madan, R. S. Gupta and **R. Chaujar**, "Performance Investigation of Heterogeneous Gate Dielectric-Gate Metal Engineered-Gate All Around-Tunnel FET for RF Applications", *Microsystem Technologies*, vol. 23, no. 9, pp.4081-4090, 2017. Impact Factor: 1.195.

4. A. Kumar, M.M. Tripathi and **R. Chaujar**, "Investigation of Parasitic Capacitances of In_2O_5Sn Gate Electrode Recessed Channel MOSFET for ULSI Switching Applications", *Microsystem Technologies*, vol. 23, no. 12, pp. 5867-5874, 2017. Impact Factor: 1.195.

5. J. Madan, R. S. Gupta and **R. Chaujar**, "Mathematical Modeling Insight of Hetero Gate Dielectric Dual Material Gate GAA tunnel FET for VLSI/analog Applications," *Microsystem Technologies*, vol. 23, no. 9, pp.4091-4098, 2017. Impact Factor: 1.195.

6. R. Pandey and **R. Chaujar**, "Numerical Simulations of Novel SiGe-based IBC-HJ Solar Cell for Standalone and Mechanically Stacked Tandem Applications", *Materials Research Bulletin*, vol. 93, pp. 282-289, 2017. Impact Factor: 2.446.

7. A. Kumar, N. Gupta and **R. Chaujar**, "Effect of Structured Parameters on Hot-Carrier Immunity of Transparent Gate Recessed Channel (TGRC) MOSFET", *Microsystem Technologies*, vol. 23, no. 9, pp.4057-4064, 2017. Impact Factor: 1.195.

8. J. Madan and **R. Chaujar**, "Gate Drain Underlapped-PNIN-GAA-TFET for Comprehensively Upgraded Analog/RF Performance", *Superlattices and Microstructures*, vol. 102, pp. 17-26, 2017. Impact Factor: 2.123.

Numerical Simulation of N+ Source Pocket PIN-GAA-Tunnel FET: Impact of Interface Trap Charges and Temperature

Jaya Madan, R. S. Gupta and **Rishu Chaujar***

This paper investigates the reliability of PINgate-all-around (GAA)-tunnel field-effect transistor (TFET) with N± source pocket. The reliability of the PNIN-GAA-TFET is examined by analyzing: 1) the impact of interface trap charge (ITC) density and polarity and 2) the temperature affect ability on analog/RF performance of the device. It is realized that the interface traps existing at the Si/SiO_2 interface modifies the flatband voltage and, thereby, alters the analog and RF characteristics of the device. The analysis is done at various trap charge densities and polarities. The results, thus, obtained reveal that, at higher trap charge density, the device performance alters significantly. It is obtained that, for a donor trap charge density of 3×10^{12} cm^{-2}, the off-state current of the device degrades tremendously (increases from an order of 10-17-10^{-9}A). The temperature affectability over the device reveals that, at lower gate bias, the Shockley-Read-Hall phenomenon dominates and degrades the subthreshold current of the device at elevated temperatures. However, for the super threshold regime, the band-to-band tunneling (BTBT) mechanism dominates. Furthermore, the results show enormous degradation in the off-state current at elevated temperatures, such that, with an increase in the ambient temperature from 200 K to 400 K, the IOFF degrades by an order of 105, i.e., increases from 10^{-18} A to 10^{-13} A. The results specify that the PNIN-GAA-TFET is insusceptible to the acceptor traps existing at the Si/SiO_2 interface in comparison with the donor traps.

For details refer to https://doi.org/10.1109/TED.2017.2670603

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Quantum Analysis based Extraction of Frequency Dependent Intrinsic and Extrinsic Parameters for GEWE-SiNW MOSFET

Neha Gupta and **Rishu Chaujar***

Abstract: This paper examines the bias-independent and bias-dependent extrinsic and intrinsic parameters of the gate electrode workfunction engineered (GEWE) silicon nanowire (SiNW) metal–oxide–semiconductor field-effect transistor (MOSFET) by considering quantum effects. The results reveal that the effect of extrinsic parameters such as the resistance, capacitance, and inductance of the electrodes is less pronounced in the GEWE-SiNW compared with the conventional SiNW or conventional MOSFET. The intrinsic transconductance of the GEWE-SiNW device can be further improved by tuning the gate metal workfunction difference, which results in shorter time constant and lower parasitic capacitance, making it suitable for radiofrequency integrated circuit (RFIC) design. It is also observed that, in the saturation region, the device exhibits improved transconductance and noticeable reduction in C_{sdx} [due to drain-induced barrier lowering (DIBL)] but the parasitic capacitance and time constant also reduce. In addition, a non-quasi-static small-signal model has been studied in terms of *Z* and *Y*parameters; the results show good agreement with the results of three-dimensional (3D) simulations at thousands of GHz.

For details refer to https://doi.org/10.1007/s10825-016-0949-4

Performance Investigation of Heterogeneous Gate Dielectric-Gate Metal Engineered–Gate All Around-tunnel FET for RF Applications

Jaya Madan, R. S. Gupta and **Rishu Chaujar***

Abstract: In this work, the effect of gate metal work function engineering (GME), gate bias and drain bias on the bias dependent parasitic capacitances has been studied. Further, RF Figure of merits (FOMs) such as power gains, cut-off frequency (f_T), maximum oscillation frequency (f_{Max}) and intrinsic delay of hetero-dielectric gate-metal-engineered gate-all-around tunnel FET (HD-GME-GAA-TFET) are studied and compared with HD-GAA-TFET. Simulation results show an appreciable improvement in RF FOMs with the application of GME architecture on GAA TFET. Further, it has been observed that GME exhibits 3.76 times enhancement and 0.017 times reduction in cut-off frequency and intrinsic delay respectively as we increase the work function difference, which makes it a promising candidate for low power switching applications. Moreover, the small signal Y-parameters have also been studied which indicates that HD-GME-GAA-TFET is a promising candidate for RF/microwave applications. All the simulations have been done using ATLAS device simulator.

For details refer to https://doi.org/10.1007/s00542-016-3143-5

**Corresponding author.*

Investigation of Parasitic Capacitances of In_2O_5Sn Gate Electrode Recessed Channel MOSFET for ULSI Switching Applications

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

Abstract: This work discusses the capacitance–voltage (C–V) analysis and frequency dependent capacitance of In_2O_5Sn (Tin Oxide) gate electrode Recessed Channel (TGRC) MOSFET with an aim to examine the effectiveness of In_2O_5Sn (Transparent) as a gate material on parasitic capacitance which prominently influences the current driving capability and thus, the switching performance. Moreover, capacitance dependent parameters such as Transconductance Frequency Product (TFP), Energy Delay Product (EDP) and Gain Bandwidth Product (GBP) are also assessed and found that, TFP increases to 6.33 times in comparison to metal gate RC MOSFET owing to a noticeable reduction in parasitic capacitance ($C_{gg} = C_{gs} + C_{gd}$), due to which EDP and GBP also improve considerably and thus reflects its effectiveness in RF amplifiers and receivers. In addition, the effect of parameter variation such as gate length (L_g) and negative junction depth (NJD) of TGRC is also observed, and results reveal that with Lg = 20 nm and NJD = 5 nm, TGRC unveils outstanding switching performance which is desirable for low power ULSI applications.

For details refer to https://doi.org/10.1007/s00542-017-3348-2

Mathematical Modeling Insight of Hetero Gate Dielectric-dual Material Gate-GAA-tunnel FET for VLSI/ analog Applications

Jaya Madan, R. S. Gupta and **Rishu Chaujar***

Abstract: This paper presents a mathematical modeling insight for the novel heterogate dielectric-dual material gate-GAA TFET (HD-DMG-GAA-TFET) and validating the results with TCAD simulation. By using the appropriate boundary conditions and continuity equations, the Poisson's equation is solved to obtain the potential profile. The developed model is used to study the analog performance parameters such as subthreshold swing (SS), threshold voltage (V_{th}), transconductance (g_m), drain conductance (g_d), device efficiency (g_m/I_{ds}), intrinsic gain (g_m/g_d), channel resistance (R_{ch}) and output resistance (R_o). Further, to optimize the effect of metal work function on analog performance, three different combinations of DMG configurations has been studied. The results demonstrated that for a difference of 0.4 eV, the analog performance of the device is optimized. Low off current and high value of on current resulting into a higher I_{ON}/I_{OFF} ratio has been obtained, which is appropriate for sub-nanometre devices and low standby power applications. The analytical results obtained from the proposed model shows good agreement with the simulated results obtained with the ATLAS device simulator.

For details refer to https://doi.org/10.1007/s00542-016-2872-9

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Numerical Simulations of Novel SiGe-based IBC-HJ Solar Cell for Standalone and Mechanically Stacked Tandem Applications

Rahul Pandey and **Rishu Chaujar***

Abstract: In this study, a novel 10 μm thick interdigitated back contact silicon-germanium heterojunction (IBC-$Si_{1-x}Ge_xHJ$) solar cell device has been designed and simulated for standalone and four-terminal mechanically stacked tandem applications. Optimization of i-a-SiGe: H thickness, the width of n-a-SiGe: H region, p-a-SiGe: H region and gap along with composition fraction (x) lead to 15.5% power conversion efficiency (PCE) in a stand-alone configuration. Whereas in combination with perovskite top subcell we further demonstrate 25.7% PCE in four-terminal tandem configuration. In mechanical stacking, top and bottom subcells are fabricated individually and then assembled in a module, which avoids the need for current matching between subcells, thereby giving greater process and design flexibility. The proposed IBC-SiGeHJ solar cell is ~ (25–30) times thinner than conventional Si solar cells which are used as bottom subcell in perovskite/silicon tandem solar cell. The results reveal that the proposed 4-terminal mechanically stacked perovskite/IBC-SiGeHJ tandem device may open new doors for the energy efficient applications. All the simulations have been done using Silvaco technology computer aided design (TCAD) simulator.

For details refer to https://doi.org/10.1016/j.materresbull.2017.05.006

Effect of Structured Parameters on the Hot-carrier Immunity of Transparent Gate Recessed Channel (TGRC) MOSFET

Ajay Kumar, Neha Gupta and **Rishu Chaujar***

Abstract: In this work, the impact of parameter variation on hot-carrier effect immunity in transparent gate recessed channel (TGRC)—MOSFET based on the hydrodynamic energy transport model have been studied. The parameters of TGRC-MOSFET investigated include the oxide thickness, negative junction depth, and substrate doping. TCAD analysis shows the performance of TGRC-MOSFET in terms of transfer characteristics, transconductance, electric field, electron velocity, electron mobility and electron temperature. The simulation results indicate the improved hot-carrier immunity for TGRC-MOSFET in 30 nm device.

For details refer to https://doi.org/10.1007/s00542-016-2918-z

*Corresponding author.

Gate Drain Underlapped-PNIN-GAA-TFET for Comprehensively Upgraded Analog/RF Performance

Jaya Madan and **Rishu Chaujar***

Abstract: This work integrates the merits of gate-drain underlapping (GDU) and Nþ source pocket on cylindrical gate all around tunnel FET (GAA-TFET) to form GDU-PNIN-GAA-TFET. It is analysed that the source pocket located at the source-channel junction narrows the tunneling barrier width at the tunneling junction and thereby enhances the ON-state current of GAA-TFET. Further, it is obtained that the GDU resists the extension of carrier density (built-up under the gated region) towards the drain side (under the underlapped length), thereby suppressing the ambipolar current and reducing the parasitic capacitances of GAA-TFET. Consequently, the amalgamated merits of both engineering schemes are obtained in GDU-PNIN-GAA-TFET that thus conquers the greatest challenges faced by TFET. Thus, GDU-PNIN-GAA-TFET results in an up-gradation in the overall performance of GAATFET. Moreover, it is realised that the RF figure of merits FOMs such as cut-off frequency (f_T) and maximum oscillation frequency (f_{MAX}) are also considerably improved with integration of source pocket on GAA-TFET. Thus, the improved analog and RF performance of GDU-PNIN-GAA-TFET makes it ideal for low power and high-speed applications.

For details refer to https://doi.org/10.1016/j.spmi.2016.12.034

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Biography

Prof. Suresh C Sharma

Department of Applied Physics

Prof. Suresh C Sharma is Head of Department of Applied Physics, Delhi Technological University, Delhi. He has worked as Professor, Department of Physics, MAIT (GGS Indraprastha University, Delhi), Delhi. He was awarded the Young Scientist project by the Department of Science and Technology (DST), Govt. of India for a two year duration (1997-99) and worked with the Department of Physics and Astrophysics, University of Delhi from Jan. 6, 1997 to Oct. 14, 1997. He was a Monbusho Postdoctoral Fellow under Japanese Govt. fellowship, Dept. of Physics, Faculty of Science, Ehime University, Matsuyama, Japan (1997-99). In addition, he has been a JSPS (Invitation) Postdoctoral Fellow and visiting researcher (2004-05) with the Center for Atomic and Molecular Technologies (CAMT), Osaka University, Japan. He was awarded Senior Research Associate under the Scientist's Pool Scheme by CSIR, Govt. of India for 3 years duration (1999-2002) and worked in the Department of Physics and Astrophysics, University of Delhi (1999-2002). He has worked on several research projects in India and abroad. He has guided numerous Ph.D., M. Tech & B. Tech students. He has published 131 research papers in Journals of International repute and Proceedings of International Conferences. He is a member of various reputed societies.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	06

1. **S.C. Sharma**, J. Panwar and R. Sharma, "Modeling of Terahertz Radiation Emission from a Free-electron Laser", *Contributions to Plasma Physics*, vol. 57, no. 4, pp. 167-175, 2017. Impact Factor: 1.440.

2. P. Malik, **S.C. Sharma** and R. Sharma, "Generating Tunable THz Radiation using Rippled Density Plasma Driven by Density Modulated Relativistic Electron Beam", *Physics of Plasmas*, vol. 24, no. 7, pp. 073101, 2017. Impact Factor: 2.115.

3. R. Gupta and **S.C. Sharma**, "Theoretical Modeling to Study the Impact of Different Oxidizers (etchants) on the Plasma-assisted Catalytic Carbon Nanofiber Growth", *Physics of Plasmas*, vol. 24, no. 7, pp. 073504, 2017. Impact Factor: 2.115.

4. J. Panwar and **S.C. Sharma**, "Modeling the Emission of High Power Terahertz Radiation using Langmuir Wave as a Wiggler", *Physics of Plasmas*, vol. 24, no. 8, pp. 083101, 2017. Impact Factor: 2.115.

5. N. Gupta and **S.C. Sharma**, "Effect of Gas Composition on Morphological Properties of Graphene Nanosheet", *Physics of Plasmas*, vol. 24, no. 7, pp. 073510, 2017. Impact Factor: 2.115.

6. R. Gupta, **S. C. Sharma** and R. Sharma. "Mechanisms of Plasma-assisted Catalyzed Growth of Carbon Nanofibres: A Theoretical Modeling", *Plasma Sources Science and Technology*, vol. 26, no. 2, p. 024006, 2017. Impact Factor: 3.302.

Modeling of Terahertz Radiation Emission from a Free-Electron Laser

Suresh C. Sharma*, Jyotsna Panwar and Rinku Sharma

Abstract: In this article, we report the generation of terahertz (THz) radiation using the interaction of a laser-modulated relativistic electron beam (REB) with a surface plasma wave. Two laser beams propagating through the modulator interact with the REB, leading to velocity modulation of the beam. This results in pre-bunching of the REB. The pre-bunched beam travels through the drift space, where the velocity modulation translates into density modulation. The density-modulated beam, on interacting with the surface plasma pump wave, acquires an oscillatory velocity that couples with the modulated beam density to give rise to a nonlinear current density which acts as an antenna to give THz radiation. By optimizing the parameters of the beam and the wiggler, we obtain power of the order of 10^{-4} using the current scheme.

For details refer to https://doi.org/10.1002/ctpp.201600085

**Corresponding author.*

Generating Tunable THz Radiation using Rippled Density Plasma Driven by Density Modulated Relativistic Electron Beam

Pratibha Malik, **Suresh C. Sharma*** and Rinku Sharma

Abstract: The generation of Terahertz (THz) radiation by a density modulated relativistic electron beam (REB) using rippled density plasma, oriented at a suitable angle along the direction of radiation wave, is being investigated in this paper. The non-linear interaction of density modulated REB with ripple density plasmamodifies the dispersion relation of the radiation wave co-propagating with the beam wave. Using fluid equations model, it is found that the requisite ripple wavelength decreases as the ripple angle increases and becomes steeper for resonant THz radiation emission. Thus, the radiation wavelength in terahertz range can be tuned by varying the ripple wavelength and beam energy. In addition, it is investigated that the growth rate of THz radiation emission scales as the one-third power of beam current, two-third power of ripple plasma density, and one-third power of modulation index. The output power and efficiency of THz radiation emission depend on the modulation index and reach the largest value when modulated beam velocity is comparable with the phase velocity of the wave as the modulation index approaches unity.

For details refer to https://doi.org/10.1063/1.4990075

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Theoretical Modeling to Study the Impact of Different Oxidizers (etchants) on the Plasma-assisted Catalytic Carbon Nanofiber Growth

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

Abstract: An analytical model based on the various surface deposition processes and plasma sheath kinetics of the plasma species (electrons, positively charged ions, radicals, and neutrals) has been developed to investigate the effects of different plasmas (different etchants) on the catalyzed plasma aided growth of carbon nanofibers (CNFs). In particular, the model accounts the poisoning of the catalyst nanoparticle, i.e., the formation of the amorphous carbon layer on the catalyst active surface due to the continuous dissociation of incoming hydrocarbon species from the plasma. It is observed that oxidizers (H_2O and O_2) in the typical hydrocarbon/hydrogen ($C_2H_2 + H_2$) plasma act as the dominant etchants and remove the amorphous carbon layer from the catalyst surface and, thus, preserve and enhance the catalyst activity. However, the growth rate of CNFs is much higher when O_2 is added as an etchant in the reactive plasma as compared to H_2O. This is due to the dual role played by the oxygen, i.e., (i) removal of amorphous carbon from the catalyst active surface, (ii) removal of hydrogen radicals that interact with the carbon species generated on the catalyst surface and suppress their diffusion through the catalyst nanoparticles. The CNF grows much longer in the presence of O_2, therefore, etching of CNF tip and deformation of catalyst nanoparticle is the maximum, and hence, the CNF tip diameter is least. Moreover, in the present investigation, we also found that the relative concentrations of H_2O or O_2 species in the reactive plasma have significant effects on the CNF growth. Our theoretical results are in good agreement with the experimental observations.

For details refer to https://doi.org/10.1063/1.4990556

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Modeling the Emission of High Power Terahertz Radiation using Langmuir Wave as a Wiggler

Jyotsna Panwar and **Suresh C. Sharma***

Abstract: The emission of high power terahertz (THz) radiation lying in the range of millimeter to submillimeter wavelengths has been studied analytically using the Langmuir wave as an electrostatic pump wave in the presence of static magnetic field for both finite and infinite geometries. The interaction of two laser beams with the relativistic electron beam leads to velocity modulation of the beam, which then translates into density modulation on traveling through the drift space. The premodulated beam on interacting with the pump wave acquires an oscillatory velocity that couples with the perturbed and modulated beam densities to result in nonlinear current density which helps in evaluating the growth rate and efficiency of the output THz radiation. The beam and plasma wave wiggler parameters are found to influence the growth rate and efficiency of the emitted THz radiation.

For details refer to https://doi.org/10.1063/1.4993611

Effect of Gas Composition on Morphological Properties of Graphene Nanosheet

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

Abstract: A multiscale theoretical model to study the effect of different gas mixtures on the nucleation and growth kinetics of a graphene nanosheet in the reactive low-temperature plasma environment has been developed. The model includes the plasma sheath formalization, kinetics of all the plasma species, charging of the graphene sheet, plasma-surface interaction, clusters and graphene islands nucleation, and vertical growth of a graphene nanosheet. The three different gas mixtures, i.e., C_2H_2, CH_4, and CF_4 with hydrogen and argon, are considered in the present investigation to examine the variations in the number densities of carbon and hydrogen species generated on the catalyst surface and their consecutive effects on the dimensions (i.e., height and thickness) and number density profiles of the graphene nanosheet. It is found that the thickness and height of the graphene sheet are maximum for C_2H_2 gas mixtures and least for CH_4 and CF_4, respectively. On the basis of the results obtained, the field emission characteristics of the graphene sheet have been analyzed, and it is estimated that C_2H_2 contained gas mixture enhances the field emission characteristics of the graphene sheet followed by CH_4 and CF_4. The presented results are in good agreement with the existing experimental observations.

For details refer to https://doi.org/10.1063/1.4993203

*Corresponding author.

Mechanisms of Plasma-assisted Catalyzed Growth of Carbon Nanofibres: A Theoretical Modeling

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

Abstract: A theoretical model is developed to study the nucleation and catalytic growth of carbon nanofibers (CNFs) in a plasma environment. The model includes the charging of CNFs, the kinetics of the plasma species (neutrals, ions and electrons), plasma pretreatment of the catalyst film, and various processes unique to a plasma-exposed catalyst surface such as adsorption of neutrals, thermal dissociation of neutrals, ion induced dissociation, interaction between neutral species, stress exerted by the growing graphene layers and the growth of CNFs. Numerical calculations are carried out for typical glow discharge plasma parameters. It is found that the growth rate of CNFs decreases with the catalyst nanoparticle size. In addition, the effect of hydrogen on the catalyst nanoparticle size, CNF tip diameter, CNF growth rate, and the tilt angle of the graphene layers to the fiber axis are investigated. Moreover, it is also found that the length of CNFs increases with hydrocarbon number density. Our theoretical findings are in good agreement with experimental observations and can be extended to enhance the field emission characteristics of CNFs.

For details refer to https://doi.org/10.1088/1361-6595/aa5120

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Biography

Dr. Vinod Singh

Department of Applied Physics

Dr. Vinod Singh has completed his B.Sc. as a University Gold Medalist and completed his M.Sc. (Physics) as a University Gold Medalist. He was also honored with Bhamashah Award (Gold Medal), presented by Sir V.S. Naipaul, Nobel Laureate. He has outstanding performance during Ph.D. course work at Department of Physics, IIT Delhi. After getting qualified in NET-JRF, GATE, JEST, he was selected by the Union Public Service Commission on the post of Lecturer in Physics and joined Delhi College of Engineering, Government of NCT of Delhi, at the age of 23 years. He has teaching experience of nearly 15 years. He has published a patent and has authored a book and many other research publications. His area of research is "Synthesis and characterization of functional nanomaterials and explore their size dependent properties and applications." He has awarded best presentation award by Bharat Ratan Prof. C. N. R. Rao, delivered many invited lectures, chaired the technical sessions and presented papers in various national and international conferences. He is member of many professional societies.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **V. Singh**, B.R. Mehta, S. K. Sengar, O.M. Karakulina, J. Hadermann and A. Kaushal, "Achieving Independent Control of Core Diameter and Carbon Shell Thickness in Pd-C Core–shell Nanoparticles by Gas Phase Synthesis", *Nanotechnology*, vol. 28, no. 29, pp. 295603, 2017. Impact Factor: 3.440.

Achieving Independent Control of Core Diameter and Carbon Shell Thickness in Pd-C Core-shell Nanoparticles by Gas Phase Synthesis

Vinod Singh*, B R Mehta, Saurabh K Sengar, Olesia M Karakulina, Joke Hadermann and Akshey Kaushal

Abstract: Pd-C core-shell nanoparticles with independently controllable core size and shell thickness are grown by gas phase synthesis. First, the core size is selected by electrical mobility values of charged particles, and second, the shell thickness is controlled by the concentration of carbon precursor gas. The carbon shell grows by adsorption of carbon precursor gas molecules on the surface of nanoparticles, followed by sintering. The presence of a carbon shell on Pd nanoparticles is potentially important in hydrogen-related applications operating at high temperatures or in catalytic reactions in acidic/aqueous environments.

For details refer to https://doi.org/10.1088/1361-6528/aa7660

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Biography

Dr. Yogita Kalra

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Dr. Yogita Kalra is working as an Assistant Professor with the Department of Applied Physics, Delhi Technological University (DTU), Delhi since 2010. Prior to joining DTU, she has worked as lecturer 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. Her research interests mainly include design of all optical integrated devices, optical nanoantennas and nanophotonic devices based on photonic crystals and meta-materials. 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 is the principal investigator/co-principal investigator of the three sponsored projects.She has authored about fifty research publications in the leading national and international journals of repute and referred conference proceedings.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. N. Shankhwar, **Y. Kalra** and R. K. Sinha, "$LiTaO_3$ based Metamaterial Perfect Absorber for Terahertz Spectrum", *Superlattices and Microstructures*, vol. 111, pp. 754-759, 2017. Impact Factor: 2.123.

2. P. Rani, S. Fatima, **Y. Kalra**, and R. K. Sinha, "Realization of All Optical Logic Gates using Universal NAND Gates on Photonic Crystal Platform", *Superlattices and Microstructures*, vol. 109, pp. 619-625, 2017. Impact Factor: 2.123.

$LiTaO_3$ based Metamaterial Perfect Absorber for Terahertz Spectrum

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

Abstract: In this article a new design of metamaterial perfect absorber (MPA) has been proposed which comprises a periodic array of $LiTaO_3$ microcylinders grown over a silver substrate. The fundamental principle of the structure is the occurrence of Mie resonance in the cylinders due to high value of refractive index (~10) of $LiTaO_3$ in the wavelength range 65–100 μm. This remarkably high refractive index is a manifestation of polaritonic resonance of $LiTaO_3$ in the considered wavelength range. The proposed structure shows high absorption coefficient in the said wavelength range with a maximum of 99.9% around 88 μm.

For details refer to https://doi.org/10.1016/j.spmi.2017.07.034

Realization of All Optical Logic Gates using Universal NAND Gates on Photonic Crystal Platform

Preeti Rani, Shiba Fatima, **Yogita Kalra*** and R.K. Sinha

Abstract: In this paper, the design of all-optical logic gates using the combination of universal NAND gates has been proposed. The photonic crystal structure consists of triangular lattice arrangement of air holes in silicon. Initially, the all optical NAND gate has been designed and optimized. Further, the optimized NAND gates have been used and arranged in a combination such that the combined structure behaves as an all-optical logic gate specifically, NOT, AND, OR, XOR and XNOR. The truth table for the designed all-optical logic gates has been verified at an operating wavelength of 1.55 μm. The proposed all optical gates exhibit a response period of 2.168 ps with a bit rate of 0.461 Tb/sec. Further, the contrast ratio for the designed gates has also been obtained.

For details refer to https://doi.org/10.1016/j.spmi.2017.05.046

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Biography

Prof. Pravir Kumar

Department of Biotechnology

Prof. Pravir Kumar is Dean (Alumni Affairs) and Professor of Biotechnology at Delhi Technological University. He has obtained MS degree from BHU, Varanasi with Molecular and clinical genetics specialization, and PhD degree from J. W. Goethe University, Germany in the field of coronary artery diseases. Before returning to India, he has spent several years in the Neurology Department at Tufts University School of Medicine, Boston, USA as a postdoctoral fellow and later at faculty position. Until April 2016, he was holding an adjunct Faculty status in the Neurology Department at Tufts University School of Medicine (TUSM). His areas of research interest and expertise include molecular chaperone, ubiquitin E3 ligase in neurodegenerative disorders along with the aberrant cell cycle re-entry into aged neurons and muscles. He is an editorial and reviewer board member of 30 leading Elsevier, Springer, BMC, Bentham, Oxford and other reputed journals. He has published 60 papers in peer-reviewed journals and more than 85 papers in conference proceedings and 22 invited talks. He has also severed as a member of national-level selection committees, including prestigious USIEF Nehru Fulbright program, and reviewer of DST-SERB and Life Science Research Board- DRDO committee. His Google h-index of publication is 15.

Award Summary & Publication Details

Category Name	No. of Publications
Commendable Research Award	03

1. R. Sharma, D. Kumar, N. K. Jha, S. K. Jha, R. K. Ambasta and **P. Kumar**, "Re-expression of Cell Cycle Markers in Aged Neurons and Muscles: Whether Cell should Divide or Die?" *Biochimica et Biophysica Acta: BBA Molecular Basis of disease*, vol. 1863, no. 1, pp. 324-336, 2017. Impact factor: 5.47.
2. S. K. Jha, N. K. Jha, D. Kumar, R. K. Ambasta and **P. Kumar**, "Linking Mitochondrial Dysfunction, Metabolic Syndrome and Stress Signaling in Neurodegeneration", *Biochimica et Biophysica Acta, BBA Molecular Basis of disease*, vol. 1863, no. 5, pp. 1132-1146, 2017. Impact factor: 5.47.

3. S. K. Jha, N. K. Jha, D. Kumar, R. Sharma, A. Shrivastava, R. K. Ambasta and **P. Kumar**, "Stress-induced Synaptic Dysfunction and Neurotransmitter Release in Alzheimer's Disease: Can Neurotransmitter and Neuromodulator be Potential Therapeutic Targets?", *Journal of Alzheimer's Disease,* vol. 57, no. 4, pp. 1017-1039, 2017. Impact factor: 3.73.

Re-expression of Cell Cycle Markers in Aged Neurons and Muscles: Whether Cells should Divide or Die?

Renu Sharma, Dhiraj Kumar, Niraj Kumar Jha, Saurabh Kumar Jha, Rashmi K Ambasta and **Pravir Kumar***

Abstract: Emerging evidence revealed that abrogated cell cycle entry into highly differentiated mature neurons and muscles is having detrimental consequences in response to cell cycle checkpoints disruption, altered signaling cascades, pathophysiological and external stimuli, for instance, Aβ, Parkin, p-tau, α-synuclein, impairment in TRK, Akt/GSK3β, MAPK/Hsp90, and oxidative stress. These factors, reinitiate undesired cell division by triggering new DNA synthesis, replication, and thus exquisitely forced mature cell to enter into a disturbed and vulnerable state that often leads to death as reported in many neuro- and myodegenerative disorders. A pertinent question arises how to reverse this unwanted pathophysiological phenomenon is attributed to the usage of cell cycle inhibitors to prevent the degradation of crucial cell cycle arresting proteins, cyclin inhibitors, chaperones and E3 ligases. Herein, we identified the major culprits behind the forceful cell cycle re-entry, elucidated the cyclin re-expression based on disturbed signaling mechanisms in neuromuscular degeneration together with plausible therapeutic strategies.

For details refer to https://doi.org/10.1016/j.bbadis.2016.09.010

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Linking Mitochondrial Dysfunction, Metabolic Syndrome and Stress Signaling in Neurodegeneration

Saurabh Kumar Jha, Niraj Kumar Jha, Dhiraj Kumar, Rashmi K Ambasta and **Pravir Kumar***

Abstract: Mounting evidence suggests a link between metabolic syndrome (MetS) such as diabetes, obesity, non-alcoholic fatty liver disease in the progression of Alzheimer's disease (AD), Parkinson's disease (PD) and other neurodegenerative diseases (NDDs). For instance, accumulated Aβ oligomer is enhancing neuronal Ca^{2+} release and neural NO where increased NO level in the brain through post translational modification is modulating the level of insulin production. It has been further confirmed that irrespective of origin; brain insulin resistance triggers a cascade of the neurodegeneration phenomenon which can be aggravated by free reactive oxygen species burden, ER stress, metabolic dysfunction, neuorinflammation, reduced cell survival and altered lipid metabolism. Moreover, several studies confirmed that MetS and diabetic sharing common mechanisms in the progression of AD and NDDs where mitochondrial dynamics playing a critical role. Any mutation in mitochondrial DNA, exposure of environmental toxin, high-calorie intake, homeostasis imbalance, glucolipotoxicity is causative factors for mitochondrial dysfunction. These cumulative pleiotropic burdens in mitochondria leads to insulin resistance, increased ROS production; enhanced stress-related enzymes that is directly linked MetS and diabetes in neurodegeneration. Since, the linkup mechanism between mitochondrial dysfunction and disease phenomenon of both MetS and NDDs is quite intriguing, therefore, it is pertinent for the researchers to identify and implement the therapeutic interventions for targeting MetS and NDDs. Herein, we elucidated the pertinent role of MetS induced mitochondrial dysfunction in neurons and their consequences in NDDs. Further, therapeutic potential of well-known biomolecules and chaperones to target altered mitochondria has been comprehensively documented. This article is part of a Special Issue entitled: Oxidative Stress and Mitochondrial Quality in Diabetes/Obesity and Critical Illness Spectrum of Diseases - edited by P. Hemachandra Reddy.

For details refer to https://doi.org/10.1016/j.bbadis.2016.06.015

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Stress-induced Synaptic Dysfunction and Neurotransmitter Release in Alzheimer's Disease: Can Neurotransmitter and Neuromodulator be Potential Therapeutic Targets?

Saurabh Kumar Jha, Niraj Kumar Jha, Dhiraj Kumar, Renu Sharma, Abhishek Shrivastava, Rashmi K Ambasta and **Pravir Kumar***

Abstract: The communication between neurons at synaptic junctions is an intriguing process that monitors the transmission of various electro-chemical signals in the central nervous system. Albeit any aberration in the mechanisms associated with transmission of these signals leads to loss of synaptic contacts in both the neocortex and hippocampus thereby causing insidious cognitive decline and memory dysfunction. Compelling evidence suggests that soluble amyloid-β (Aβ) and hyperphosphorylated tau serve as toxins in the dysfunction of synaptic plasticity and aberrant neurotransmitter (NT) release at synapses consequently causing a cognitive decline in Alzheimer's disease (AD). Further, an imbalance between excitatory and inhibitory neurotransmission systems induced by impaired redox signaling and altered mitochondrial integrity is also amenable for such abnormalities. Defective NT release at the synaptic junction causes several detrimental effects associated with altered activity of synaptic proteins, transcription factors, Ca2+ homeostasis, and other molecules critical for neuronal plasticity. These detrimental effects further disrupt the normal homeostasis of neuronal cells and thereby causing synaptic loss. Moreover, the precise mechanistic role played by impaired NTs and neuromodulators (NMs) and altered redox signaling in synaptic dysfunction remains mysterious, and their possible interlink still needs to be investigated. Therefore, this review elucidates the intricate role played by both defective NTs/NMs and altered redox signaling in synaptopathy. Further, the involvement of numerous pharmacological approaches to compensate neurotransmission imbalance has also been discussed, which may be considered as a potential therapeutic approach in synaptopathy associated with AD.

For details refer to https://doi.org/10.3233/JAD-160623.

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Dr. Yasha Hasija (B.Tech, M.Tech, Ph.D.) is currently working as Assistant Professor at Department of Biotechnology, Delhi Technological University. She completed her Ph.D. from CSIR-Institute of Genomics and Integrative Biology and University of Pune. She has published several papers in national and international journals of high repute, and has been awarded several prestigious awards, including the DST Award for attending the meeting of Nobel Laureates and Students in Lindau & 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, CSIR-OSDD and DBT. She is an editorial member and reviewer of several reputed journals. She has served as an invited expert and has delivered invited technical and memorial talks at several prestigious universities and institutes. She has published 50 papers in peer-reviewed journals and conferences; 05 book chapters and 13 invited talks. 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 & Publication Details

Category Title	No. of Publications
Commendable Research Award	01

1. I. Srivastava, P. Khurana, M. Yadav and **Y. Hasija**, "An Integrative System Biology Approach to Unravel Potential Drug Targets for Multiple Age related Disorders", *BBA-Proteins and Proteomics*, vol. 1865, no. 12, pp. 1729-1738, 2017. Impact Factor: 2.773.

An Integrative System Biology Approach to Unravel Potential Drug Candidates for Multiple Age Related Disorders

Isha Srivastava, Pooja Khurana, Mohini Yadav and **Yasha Hasija***

Abstract: Aging, though an inevitable part of life, is becoming a worldwide social and economic problem. Healthy aging is usually marked by low probability of age related disorders. Good therapeutic approaches are still in need to cure age related disorders. Occurrence of more than one ARD in an individual, expresses the need of discovery of such target proteins, which can affect multiple ARDs. Advanced scientific and medical research technologies throughout last three decades have arrived to the point where lots of key molecular determinants affect human disorders can be examined thoroughly. In this study, we designed and executed an approach to prioritize drugs that may target multiple age related disorders. Our methodology, focused on the analysis of biological pathways and protein protein interaction networks that may contribute to the pharmacology of age related disorders, included various steps such as retrieval and analysis of data, protein-protein interaction network analysis, and statistical and comparative analysis of topological coefficients, pathway, and functional enrichment analysis, and identification of drug-target proteins. We assume that the identified molecular determinants may be prioritized for further screening as novel drug targets to cure multiple ARDs. Based on the analysis, an online tool named as 'ARDnet' has been developed to construct and demonstrate ARD interactions at the level of PPI, ARDs and ARDs protein interaction, ARDs pathway interaction and drug-target interaction. The tool is freely made available at http://genomeinformatics.dtu.ac.in/ARDNet/Index.html.

For details refer to https://doi.org/10.1016/j.bbapap.2017.07.016

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Biography

Prof. Ashutosh Trivedi

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Prof. Ashutosh Trivedi is working in Department of Civil Engineering and is Dean of Industrial Research and Development, Delhi Technological University, Delhi, India. He is currently on the editorial board of two eminent scholarly international journals namely, Acta Geotechnica and International Journal of Geosynthetics and Ground Engineering. His past affiliations include Professor of Civil Engineering and Dean, Faculty of Technology, University of Delhi, Dean Continuing Education, Delhi College of Engineering, Head of the Department of Civil Engineering, University of Delhi, Delhi Technological University, and Thapar Institute of Engineering and Technology (Now Thapar University), Patiala. He graduated from REC (Now NIT), Kurukshetra. His solo authored research publications appeared in the reputed journals, namely, Acta Geotechnica, International Journal of Geomechanics, Journal of Rock Mechanics and Geotechnical Engineering and Rock Mechanics and Rock Engineering. He has supervised a number of Ph.D. scholars, prestigious consultancy and research projects. He has two patents to his credit in national phase and two PCTs at World Intellectual Property Organisation. He is a fellow of Indian Association of Structural Engineers and an active member of several professional societies namely, ASCE, ISRMTT and ISTE. His research interests include engineering of fractured masses, dynamics of soils and rocks, flow amid fractured and un-cemented fills, and bio-cemented soils and rocks.

Award Summary & Publications Details

Category Title	No. of Publication
Commendable Research Award	01

1. **A. Trivedi,** "Comments on Modulus Ratio and Joint Factor Concepts to Predict Rock Mass Response" *Rock Mechanics and Rock Engineering*, vol. 50, no. 5, pp. 1357–1362, 2017. Impact Factor: 2.905.

Comments on Modulus Ratio and Joint Factor Concepts to Predict Rock Mass Response

Ashutosh Trivedi*

Abstract: The use of modulus ratio and joint factor to predict rock mass response is an interesting concept. The formulation of joint factor invoked a keen interest among the field engineers. The example of several slope failures indicates that the failure surface is often well oriented. It exhibits the importance of preexisting joint-induced sliding in jointed rock mass despite very significant intact rock strength. The evaluation of rock mass strength has been historically based on empirical observations of cumulative visible strain history appearing in the form of fractures, discontinuities and joints. The authors have presented an interesting account on the empirical correlation of joint factor with GSI, RMR and Q systems for the rock masses. Accordingly, the authors have used these observations to access compressive strength ($^{\sigma}c_j$), modulus (E_j), cohesion (c_j) and friction angle and to predict stress–strain response of rock mass.

For details refer to https://doi.org/10.1007/s00603-017-1229-8

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Biography

Dr. Anil Singh Parihar

Department of Computer Science & Engineering

Dr. Anil Singh Parihar is an Associate Professor in the Discipline of Computer Engineering, Department of Computer Science & Engineering, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. Earlier he worked as an Assistant Professor in the Department of Information Technology, Delhi Technological University), Delhi, India. He received his Bachelor of Technology degree in Electronics & Communication Engineering from the U. P. Technical University, Lucknow, Master of Engineering degree in Electronics & Communication Engineering from Delhi College of Engineering, Delhi, India, and PhD degree from Delhi Technological University, Delhi, India. He has authored several research papers in international journal and conferences of high repute including IEEE Transactions on Fuzzy Systems and IEEE Transactions on Image Processing. His research area includes Machine Learning, Pattern Recognition, Computer Vision, Digital Image Processing, Biometric Security, Evolutionary Computing, and Artificial Intelligence.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **A.S. Parihar**, O. P. Verma, and C. Khanna, "Fuzzy-Contextual Contrast Enhancement", *IEEE Transactions on Image Processing*, vol. 26, no. 4, pp. 1810-1819, 2017. Impact Factor: 4.828.

Fuzzy-Contextual Contrast Enhancement

Anil Singh Parihar*, Om Prakash Verma and Chintan Khanna

Abstract: This paper presents contrast enhancement algorithms based on fuzzy contextual information of the images. We introduce fuzzy similarity index and fuzzy contrast factor to capture the neighborhood characteristics of a pixel. A new histogram, using fuzzy contrast factor of each pixel is developed, and termed the fuzzy dissimilarity histogram (FDH). A cumulative distribution function is formed with normalized values of an FDH and used as a transfer function to obtain the contrast enhanced image. The algorithm gives good contrast enhancement and preserves the natural characteristic of the image. In order to develop a contextual intensity transfer function, we introduce a fuzzy membership function based on fuzzy similarity index and coefficient of variation of the image. The contextual intensity transfer function is designed using the fuzzy membership function to achieve final contrast enhanced image. The overall algorithm is referred as the fuzzy contextual contrast-enhancement algorithm. The proposed algorithms are compared with the conventional and the state-of-the-art contrast enhancement algorithms. The quantitative and visual assessment of the results is performed. The results of quantitative measures are statistically analyzed using t-test. The exhaustive experimentation and analysis show the proposed algorithm efficiently enhances contrast and yields in natural visual quality images.

For details refer to https://doi.org/10.1109/TIP.2017.2665975

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Biography

Dr. Rahul Katarya

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Dr. Rahul Katarya is working as an Associate Professor in the Department of Computer Science & Engineering, Delhi Technological University (formerly Delhi College of Engineering), New Delhi, India. Earlier he worked as an Assistant Professor in the Department of Information Technology, Delhi Technological University (formerly Delhi College of Engineering), New Delhi India. His research interests are Big Data Analytics, Data Science, Web Mining, Social Networks, Recommender Systems, Machine Learning, Web Personalization, Knowledge Discovery & Management, Computational Intelligence, Multimedia and Internet Technologies, Software Engineering, Software Quality & Testing, Online Human Behaviour Analysis, Intellectual Property Rights and Business Intelligence. He is a valued member of Institute of Electrical and Electronics Engineers (IEEE) and Life member of Computer Society of India (SCI). He has published various research articles in Science Citation Index (SCI) international journals and in premier IEEE Conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **R. Katarya** and O.P. Verma, "Effectual Recommendations using Artificial Algae Algorithm and Fuzzy c-mean", *Swarm and Evolutionary Computation,* vol. 36, pp. 52-61, 2017. Impact Factor: 3.893.

2. **R. Katarya** and O.P. Verma, "An Effective Web Page Recommender System with Fuzzy c-mean Clustering", *Multimedia Tools and Applications,* vol. 76, no. 20, pp. 21481-21496, 2017. Impact Factor: 1.530.

Effectual Recommendations using Artificial Algae Algorithm and Fuzzy c-mean

Rahul Katarya* and Om Prakash Verma

Abstract: Recommender systems play a significant role in e-commerce applications. The primary motive of a recommender system is to recommend some items or products to the users based on their previous ratings of other products in the online environment. In this article, we presented a hybrid collaborative filtering based recommender system that improved the accuracy of the recommendations. In our work, we adopted fuzzy c-mean (FCM) and a recent bio-inspired approach, which is artificial algae algorithm (AAA). We have used advanced multilevel Pearson correlation coefficient (PCC) to find the similarity between two users. Moreover, we discovered the rating which the user will most likely give to the movies which he has not given any ratings yet. By applying above-mentioned procedures, the quality of the recommendations is improved significantly. The proposed system succeeded to provide recommendations of better quality and accuracy when compared to other alternatives. We have experimented and evaluated our proposed recommender system on four real data sets: Movielens 100,000, Movielens 1 million, Jester and Epinion. We concluded that our proposed recommender system delivered better recommendations for all four datasets. The efficiency of the system was estimated by evaluation metrics such as mean absolute error (MAE), precision and recall and showed impressive results. This proposed system delivered best results as compared to our previous work (Katarya and Verma, 2016) [1].

For details refer to https://doi.org/10.1016/j.swevo.2017.04.004

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An Effective Web Page Recommender System with Fuzzy c-mean Clustering

Rahul Katarya* and Om Prakash Verma

Abstract: With the exponential development of the number of users browsing the internet, an important factor that now the developer community is focussing on is the user experience. Recommender systems are the platforms that make personalized recommendations for a particular user by predicting the ratings for various items. Recommender systems majorly ignore the sequential information and rather focus on content information, but sequential information also provides much information about the behavior of the user. In this research work, we have presented a novel web-based recommender system which is based on sequential information of user's navigation on web pages. We received top-N clusters when Fuzzy C-mean (FCM) clustering is employed. We determined the similar users for the target user and also evaluated the weight for each web page. We have tried to solve that problem of recommender systems as we offered a system to forecast a user's next Web page visit. In our work, we proposed a system which generates recommendations to the users, by considering the sequential information that exists in their usage patterns of Web pages. We employed fuzzy clustering to give recommender system a sequential approach. We calculated weights for each page category considered in our system and predict top page recommendation for the target user. The real-world dataset of MNSBC is used in the experiments. The dataset consists of 5000 user entries with 6, entries per user. When we performed a comparison between the existing model with our proposed model, then it clearly showed that the accuracy of the proposed model is almost three times better than some existing systems. The accuracy of our proposed model is nearly 33 %.

For details refer to https://doi.org/10.1007/s11042-016-4078-7

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Biography

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Dr. Ruchika Malhotra is an Associate Head & Associate Professor at the Discipline of Software Engineering, Department of Computer Science & Engineering, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. 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 Best Faculty Award 2013 of $5000. She is author of book on Empirical Research in Software Engineering published by CRC Press, 2015 & coauthor of a book on Object Oriented Software Engineering published by PHI Learning, 2012. Her research interests are in empirical software engineering, software testing, improving software quality, statistical and adaptive prediction models, software metrics and the definition and validation of software metrics. She has published 140 research papers in international journals and conferences. Her h-index as reported by Google Scholar is 23.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	03

1. **R. Malhotra**, M. Khanna and R. Raje, "On the Application of Search-Based Techniques for Software Engineering Predictive Modeling: A Systematic Review and Future Directions", *Swarm and Evolutionary Computation*, vol. 32, pp. 85-109, 2017. Impact Factor: 3.893.

2. **R. Malhotra** and M. Khanna, "An Empirical Study for Software Change Prediction using Imbalanced Data", *Empirical Software Engineering*, vol. 22, no. 6, pp. 2806-2851, 2017. Impact Factor: 3.275.

3. **R. Malhotra** and M. Khanna, "An Exploratory Study for Software Change Prediction in Object-Oriented Systems using Hybridized Techniques", *Automated Software Engineering*, vol. 24, no. 3, pp. 673-717, 2017. Impact Factor: 2.625.

On the Application of Search-Based Techniques for Software Engineering Predictive Modeling: A Systematic Review and Future Directions

Ruchika Malhotra*, Megha Khanna and Rajeev Raje

Abstract: Software engineering predictive modeling involves construction of models, with the help of techniques have gained importance as they help the developers and project-managers in the identification of optimal solutions for developing effective prediction models. In this paper, we perform a systematic review of 78 primary studies from January 1992 to December 2015 which analyse the predictive capability of search-based techniques for ascertaining four predominant software quality attributes, i.e., effort, defect proneness, maintainability and change proneness. The review analyses the effective use and application of search-based techniques by evaluating appropriate specifications of fitness functions, parameter settings, validation methods, accounting for their stochastic natures and the evaluation of developmental models with the use of well-known statistical tests. Furthermore, we compare the effectiveness of different models, developed using the various search-based techniques amongst themselves, and also with the prevalent machine learning techniques used in literature. Although there are very few studies which use search-based techniques for predicting maintainability and change proneness, we found that the results of the application of search-based techniques for effort estimation and defect prediction are encouraging. Hence, this comprehensive study and the associated results will provide guidelines to practitioners and researchers and will enable them to make proper choices for applying the search-based techniques to their specific situations.

For details refer to https://doi.org/10.1016/j.swevo.2016.10.002

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An Empirical Study for Software Change Prediction using Imbalanced Data

Ruchika Malhotra* and Megha Khanna

Abstract: Software change prediction is crucial in order to efficiently plan resource allocation during testing and maintenance phases of a software. Moreover, correct identification of change-prone classes in the early phases of software development life cycle helps in developing cost-effective, good quality and maintainable software. An effective software change prediction model should equally recognize change-prone and not change-prone classes with high accuracy. However, this is not the case as software practitioners often have to deal with imbalanced data sets where instances of one type of class is much higher than the other type. In such a scenario, the minority classes are not predicted with much accuracy leading to strategic losses. This study evaluates a number of techniques for handling imbalanced data sets using various data sampling methods and MetaCost learners on six open-source data sets. The results of the study advocate the use of resample with replacement sampling method for effective imbalanced learning.

For details refer to https://doi.org/10.1007/s10664-016-9488-7

An Exploratory Study for Software Change Prediction in Object-Oriented Systems using Hybridized Techniques

Ruchika Malhotra* and Megha Khanna

Abstract: Variation in software requirements, technological upgrade and occurrence of defects necessitate change in software for its effective use. Early detection of those classes of a software which are prone to change is critical for software developers and project managers as it can aid in efficient resource allocation of limited resources. Moreover, change prone classes should be efficiently restructured and designed to prevent introduction of defects. Recently, use of search based techniques and their hybridized counter-parts have been advocated in the field of software engineering predictive modeling as these techniques help in identification of optimal solutions for a specific problem by testing the goodness of a number of possible solutions. In this paper, we propose a novel approach for change prediction using search-based techniques and hybridized techniques. Further, we address the following issues: (i) low repeatability of empirical studies, (ii) less use of statistical tests for comparing the effectiveness of models, and (iii) non-assessment of trade-off between runtime and predictive performance of various techniques. This paper presents an empirical validation of search-based techniques and their hybridized versions, which yields unbiased, accurate and repeatable results. The study analyzes and compares the predictive performance of five search-based, five hybridized techniques and four widely used machine learning techniques and a statistical technique for predicting change prone classes in six application packages of a popular operating system for mobile—Android. The results of the study advocate the use of hybridized techniques for developing models to identify change prone classes.

For details refer to https://doi.org/10.1007/s10515-016-0203-0

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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 National Institute of Technology (Erstwhile REC Kurukshetra), 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, held at Orlando, Florida, USA. He is also the winner of Researcher's Merit Scholarship of the University of Quebec, Canada for the three years consecutively, 2008, 2009, and 2010 for his excellent research work culminating to Ph.D. 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. 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. A. Trivedi and **M. Singh**, "Repetitive Controller for VSIs in Droop-Based AC-Microgrid", *IEEE Transactions on Power Electronics*, vol. 32, no. 8, pp. 6595-6604, 2017. Impact Factor: 7.151.

Repetitive Controller for VSIs in Droop-Based AC-Microgrid

Ashutosh Trivedi and **Mukhtiar Singh***

Abstract: A major requirement of ac-microgrid is to keep on feeding its connected load at regulated voltage and frequency, which is difficult to achieve especially in inverter-based microgrid. In modern distribution system, most of the loads are nonlinear in nature and draw harmonic current. The variable load with the nonlinear characteristics may distort the output voltage and degrade the power quality. In order to mitigate the negative impact of these disturbances on the output voltage, a novel repetitive controller (RC) has been proposed. A mixed-sensitivity-based approach is used here to design the RC and the comparison of performance with nonlinear load is shown with a conventional proportional plus integral regulator. The overall microgrid system is designed and simulated with the help of various toolboxes available in MATLAB/SIMULINK. Furthermore, a scaled hardware prototype of microgrid consisting of two voltage source inverter is developed and controlled using RC in real time with the help of field programmable gate array (FPGA).

For details refer to https://doi.org/10.1109/TPEL.2016.2619367

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Biography

Prof. Vishal Verma

Department of Electrical Engineering

Prof. Vishal Verma received the B.Tech. degree from G.B. Pant University, Pantnagar, India, and the M.Tech. and Ph.D. degrees from the Indian Institute of Technology, New Delhi, India. In 1991, he joined the Department of Electrical Engineering, G.B. Pant University, as an Assistant Professor and later in 2004, joined the Delhi College of Engineering (Now Delhi Technological University), Delhi, India, where he became a Professor in 2009.He is currently serving as a Full Professor in the Department of Electrical Engineering and Dean Academics (PG). He is a Member of ISTE and a Life Member of CES(I). His field of interest includes power electronics, power-quality issues, grid integration of renewable energy sources, and ac–dc microgrids.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **V. Verma** and A. Kumar, "Cascaded Multilevel Active Rectifier Fed Three-Phase Smart Pump Load on Single Phase Rural Feeder", *IEEE Transactions on Power Electronics*, vol. 32, no. 7, pp. 5398-5410, 2017. Impact Factor: 7.151.

Cascaded Multilevel Active Rectifier Fed Three-Phase Smart Pump Load on Single Phase Rural Feeder

Vishal Verma and Amritesh Kumar

Abstract: Irrigation pumping system that marks a sizeable load on the grid is generally blind on assessment of peak demand hours, while in operation. Such operation if smartly controlled may avoid shedding of some connected loads to match power demand. Moreover, due to the accessibility of only single-phase supply, the rural pump three-phase loads are supplied through either by splitting ac single phase into three phases or by single phase ac-dc three-phase ac conversion. Such configuration suffers from power quality problems, higher capacitor voltages, and common mode voltage problems, etc. A seven-level cascaded multilevel active rectifier (CMAR) is proposed here to provide power through three different dc links to reduce the voltage rating of capacitors, feed vector-controlled open end winding induction motor pump in addition to variable illumination LED lighting. The control employed for CMAR enhances the grid support operation by flexibly controlling power on the dc links. The control is invoked by adjusting the speed of the pump by sensing the grid frequency using droop characteristics thereby acting as smart pump load. The effectiveness of the proposed configuration and control is investigated both through simulation and experimentation on same scale hardware prototype.

For details refer to https://doi.org/10.1109/TPEL.2016.2605005

Biography

Dr. Dinesh Kumar Vishwakarma

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Dr. Dinesh Kumar Vishwakarma received the B.Tech. degree from Dr. Ram Manohar Lohia Awadh University, Faizabad, India, in 2002, the M.Tech. degree from the Motilal Nehru National Institute of Technology, Allahabad, India, in 2005, an d the Ph.D. degree in computer vision from Delhi Technological University, New Delhi, India, in 2016. He is currently an Assistant Professor with the Department of Electronics and Communication Engineering, Delhi Technological University. His current research interests include Computer Vision, Computational Intelligence, Human Activity Recognition, Hand Gesture Recognition, Gait Analysis, and Machine Learning. Dr. Vishwakarma is a Reviewer of various journals of IEEE/IET, Springer, and Elsevier.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **D.K. Vishwakarma** and K. Singh, "Human Activity Recognition Based on Spatial Distribution of Gradients at Sublevels of Average Energy Silhouette Images", *IEEE Transaction on Cognitive and Developmental Systems*, vol. 9, no. 4, pp. 316- 327, 2017. Impact factor 1.63.

Human Activity Recognition Based on Spatial Distribution of Gradients at Sublevels of Average Energy Silhouette Images

Dinesh Kumar Vishwakarma and Kuldeep Singh

Abstract: The aim of this paper is to present a unified framework for human action and activity recognition by analysing the effect of computation of spatial distribution of gradients (SDGs) on average energy silhouette images (AESIs). Based on the analysis of SDGs computation at various decomposition levels, an effective approach to compute the SDGs is developed. The AESI is constructed for the representation of the shape of action and activity and these are the reflection of 3-D pose into 2-D pose. To describe the AESIs, the SDGs at various sublevels and sum of the directional pixels (SDPs) variations is computed. The temporal content of the activity is computed through R-transform (RT). Finally, the shape computed through SDGs and SDPs, and temporal evidences through RT of the human body is fused together at the recognition stage, which results in a new powerful unified feature map model. The performance of the proposed framework is evaluated on three different publicly available datasets, i.e., Weizmann, KTH, and Ballet and the recognition accuracy is computed using hybrid classifier. The highest recognition accuracy achieved on these datasets is compared with the similar state-of-the-art techniques and demonstrate the superior performance.

For details refer to https://doi.org/10.1109/TCDS.2016.2577044

Biography

Mrs. N. Jayanthi

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Mrs. N. Jayanthi is an Assistant Professor in the department of Electronics and Communication Engineering at Delhi Technological University, since 2007. She has done B.E. in Electronics and Communication Engineering from Bharathidasan University, Trichy, Tamil Nadu and M.Tech.in Communication Systems from National Institute of Technology, Trichy. She has submitted her Ph.D. thesis titled "Analysis of Digitized Historical Inscriptions and Manuscripts at Delhi Technological University. Her areas of interest includes image processing, machine learning and Communication systems. She has published a number of technical papers in International Conferences and reputed Journals. She has completed a DST sponsored project titled "Development of OGC standards based sensor network for intelligent traffic management" in the capacity of Co-principal investigator. She has published a book chapter titled "Processing of Historic Inscription Images", Digital Hampi: Preserving Indian cultural Heritage IDH by Springer publishers. She has guided a number of students in their thesis work at both undergraduate and postgraduate levels. She has also acted as reviewer of international conferences and Journals. She has delivered expert lectures in the Faculty Development Programmes at various institutions. She is member in professional societies such as IEEE and Intelligent Transport system (ITS) and also life member in Pattern Recognition and Artificial Intelligence (IUPARI).

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **J. Natarajan** and I. Sreedevi, "Enhancement of Ancient Manuscript Images by Log based Binarization Technique", *AEU-International Journal of Electronics and Communications*, vol. 75, pp. 15-22. 2017. Impact Factor: 1.147.

Enhancement of Ancient Manuscript Images by Log based Binarization Technique

Jayanthi Natarajan* and Indu Sreedevi

Abstract: Enhancement of ancient manuscripts is a predominant field in the world of image processing. Binarization is the essential tool to recognize the text through OCR technologies for the preservation of the ancient manuscripts. This paper addresses the problem of enhancing and binarizing the deteriorated old manuscripts by a simple novel method called Log based binarization. The proposed method modifies the pixel intensity so as to better differentiate the black pixels and thus produce better binarization results, has been explored. Detailed comparison of existing thresholding algorithms with the new algorithm has been given. The inspiration for the new algorithm was drawn from the standard Niblack algorithm and Nick Algorithm.

For details refer to https://doi.org/10.1016/j.aeue.2017.03.002

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Biography

Prof. O. P. Verma

Department of Electronics & Comm. Engineering

Prof. O. P. Verma received his B.E. degree from MNIT Jaipur, M. Tech. degree from IIT Delhi and PhD from University of Delhi, India. From 1992 to 1998 he was Assistant Professor in Department of ECE at MNIT, Jaipur. He joined Department of Electronics & Communication Engineering, Delhi Technological University as Associate Professor in 1998. Currently, he is Professor in Department of Electronics and Communication Engineering and working as Principal G. B. Pant Govt. Engineering College, Delhi on diverted capacity from DTU. He is the author of 78 publications, 32 in International Journals (most of them are published in IEEE Transactions, Science Direct and Springers) and 46 in Conference proceedings. His present research interest includes: Applied Soft Computing, Nature Inspired Algorithms, Swarm Intelligent, Evolutionary Computing, Image Processing. Prof O P Verma has wide administrative experience as Dean Continuing Education (2012-2014), Head, Department of Computer Science and Engineering (2014-2017), Head, Department of Information Technology (2008-2014), Head, Computer Centre (2014-2017), Chairman B. Tech Admission Admissions Committee (2011-12, 2012-13 and 2013-14, 2016-17), Chairman Computer and Computer Peripheral Committee etc. at DTU. He has also established campus wide network successfully in DTU.

Award Summary & Publications Details

Category Title	No. of Publications
Premier Research Award	01

1. **O.P. Verma** and A. S. Parihar, "An Optimal Fuzzy System for Edge Detection in Color Images using Bacterial Foraging Algorithm", *IEEE Transaction on Fuzzy System*, vol. 25, no. 1, pp. 114-127, 2017. Impact factor: 7.671.

An Optimal Fuzzy System for Edge Detection in Color Images using Bacterial Foraging Algorithm

Om Prakash Verma and Anil Singh Parihar

Abstract: This paper presents a fuzzy system for edge detection, using smallest univalue segment assimilating nucleus (USAN) principle and bacterial foraging algorithm (BFA). The proposed algorithm fuzzifies the USAN area obtained from the original image, using a USAN area histogram-based Gaussian membership function. A parametric fuzzy intensification operator (FINT) is proposed to enhance the weak edge information, which results in another fuzzy set. The fuzzy measures, i.e., fuzzy edge quality factor and sharpness factor, are defined on fuzzy sets. The BFA is used to optimize the parameters involved in the fuzzy membership function and the FINT. The fuzzy edge map is obtained using optimized parameters. The adaptive thresholding is used to defuzzify the fuzzy edge map to obtain a binary edge map. The experimental results are analyzed qualitatively and quantitatively. The quantitative measures, i.e., Pratt's figure of merit, Cohen' Kappa, Shannon's entropy, and edge strength similarity-based edge quality metric, are used. The quantitative results are statistically analyzed using t-test. The proposed algorithm outperforms many of the traditional and state-of-the-art edge detectors.

For details refer to https://doi.org/10.1109/TFUZZ.2016.2551289

Biography

Dr. A.K. Haritash

Department of Environmental Engineering

Dr. A.K. Haritash is an Assistant Professor in the Department of Environmental Engineering, Delhi Technological University. 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, Advanced Oxidation Processes (AOPs), and bioremediation. He has around 65 publications in the form of research papers, conference abstracts, articles, and an edited book (translated from English to Hindi). 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 on the panel of subject experts in National Science Centre (Polland); Ministry of Drinking Water and Sanitation, Govt. of India; Shastri Indo-Canadian Institute; TERI School of Advanced Studies; and SGT University, Gurugram. He is member of Editorial Board of Indian Journal of Waste Management and Applied Chemical Engineering journal. Dr. Haritash has participated in several national and international seminars, conferences, and workshops.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **A.K. Haritash**, K. Mathur, P. Singh and S.K. Singh, "Hydrochemical Characterization and Suitability Assessment of Groundwater in Baga–Calangute Stretch of Goa, India", *Environmental Earth Sciences*, vol. 76, no. 9, pp. 341, 2017. Impact Factor: 1.765.

Hydrochemical Characterization and Suitability Assessment of Groundwater in Baga–Calangute Stretch of Goa, India

A. K. Haritash*, Karamveer Mathur, Priyanka Singh, S. K. Singh

Abstract: The present study is the first attempt to determine the suitability of groundwater for drinking and irrigation in the Baga–Calangute stretch of Goa. The suitability of groundwater for potable use was assessed by comparing observed values against standards prescribed by the Bureau of Indian Standards, and the quality was classified based on the Weighted Arithmetic Water Quality Index. Most of the groundwater samples (90%) were found to be suitable for drinking except for hardness, chlorides, and nitrates. The percent sodium (%Na), residual sodium carbonate, soluble sodium percentage, sodium adsorption ratio, Kelly's ratio, and Permeability Index were found to be within the prescribed limits for irrigation purposes. The major mechanism controlling groundwater chemistry, i.e., rock–water interaction, was also studied, and it was found that silicate weathering plays a major role in the dissolution of minerals. Based on the hydrochemical characterization, the water was observed to be of the Ca–$NaSO_4$ composition type except for one sample which was of the Na–Cl composition type. Classification of the meteoric genesis suggested that the groundwater in surficial aquifers in the region had a deep meteoric percolation, and its chemistry is regulated by rock–water interaction.

For details refer to https://doi.org/10.1007/s12665-017-6679-5

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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 (DTU). She completed her Bachelors in Technology (B.Tech) in Electronics Engineering from Cochin University of Science & Technology (2002), Masters in Engineering (M.E.) in Electronics & Communication (2008) from the erstwhile 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, Pattern Recognition, Image Processing & Soft Computing with the area of specialization being the use of statistical inferencing tools for Machine Learning and Pattern Recognition. She has published 40 papers in National and International Journals and Conferences. She has a total teaching experience of 15 years and has been associated with the Department of Information Technology, DTU since July 2010. She is a member of several societies. She is also a reviewer of IEEE Transactions on System, Man, Cybernetics, IEEE Transactions on Multimedia, Computers & Electrical Engineering (Elsevier), IET Image Processing, IET Computer Vision and IET Biometrics. 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. Sharma, "Automatic Texture Defect Detection using Gaussian Mixture Entropy Modeling" *Neurocomputing*, vol. 239, pp. 232-237, 2017. Impact Factor: 3.317.

Automatic Texture Defect Detection using Gaussian Mixture Entropy Modeling

Seba Susan* and Monika Sharma

Abstract: In this paper we propose a new unsupervised, automated texture defect detection that does not require any user-inputs and yields high accuracies at the same time. To achieve this end we use the non-extensive entropy with Gaussian gain as the regularity index, computed locally from texture patches through a sliding window approach. The optimum window size is determined by modeling the entropy values by a two-mode Gaussian mixture model and checking for the minimum entropy of the mode-probabilities. The outlier entropy values corresponding to defective areas are defined as those that exceed thrice the standard deviation, as is the norm in statistics. The result is automatic defect detection with no manual intervention. Empirical results on defective texture images from the Brodatz database provide accurate localization of the defect as compared to Chetverikov and Hanbury's maximal regularity method, which requires manual setting of threshold parameters for each type of texture despite of being a benchmark for texture defect detection.

For details refer to https://doi.org/10.1016/j.neucom.2017.02.021

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Biography

Dr. N. Yuvraj

Department of Mechanical Engineering

Dr. N. Yuvraj did his B. E in Production Engineering from Government College of Technology, Coimbatore, in 1996, M.E in Mechanical Engineering from Delhi College of Engineering and PhD in Mechanical Engineering from Delhi Technological University. Since 2000, he has been working as an Assistant Professor in the Department of Mechanical Engineering, Delhi Technological University (Formerly Delhi College of Engineering), Delhi, India. He is doing active research in the area of surface composites. His other areas of interest include friction stir welding & processing, stir casting and surface analysis. He has published 25 papers in different international journals & conferences.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **N. Yuvaraj**, S. Aravindan and Vipin, "Comparison Studies on Mechanical and Wear Behavior of Fabricated Aluminium Surface Nano Composites by Fusion and Solid State Processing", *Surface and Coatings Technology*, vol. 309, pp. 309-319, 2017. Impact Factor: 2.589.

Comparison Studies on Mechanical and Wear Behavior of Fabricated Aluminium Surface Nano Composites by Fusion and Solid State Processing

N. Yuvaraj*, S. Aravindan and Vipin

Abstract: By way of increasing the wear resistance, the service life of the industrial components can be enhanced. Nowadays fabrication of surface composites plays a vital role in improving wear resistance. This study attempts to fabricate such surface composites by way of incorporating nano particles of Boron carbide into the Aluminum 5083 alloy by Tungsten Inert Gas (TIG) arc process (liquid state) and friction stir (solid state) process. Microstructural studies were carried out on the processed region to analyze the dispersion of reinforcement particles. Hardness survey and dry sliding wear tests at different sliding loads (30 N, 60 N &120 N) were carried out to investigate the effect of reinforcing particles. The hardness and wear resistance of the fabricated surface composite by both the processes are found to be higher than the base material. Friction stir processed surface composites are possessing higher hardness and wear resistance than that of TIG arc processed composites. The worn out surfaces of the composites and wear debris were analyzed through SEM studies to understand the wear mechanisms.

For details refer to https://doi.org/10.1016/j.surfcoat.2016.11.076

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Biography

Dr. Mohammad Zunaid

Department of Mechanical Engineering

Dr. Mohammad Zunaid is a faculty in the Department of Mechanical Engineering, Delhi Technological University (Formerly Delhi College of Engineering) Delhi since 2009. He received his Bachelor's and Master's Degree in Mechanical Engineering from Aligarh Muslim University, Aligarh, India. He did his Ph.D. in the area of Computational Fluid Dynamics applications in Fluid mechanics and heat & mass transfer from Department of Mechanical Engineering, DTU, Delhi. His teaching and research interest are in the area of heat & mass transfer and CFD. He guided more than ten M.Tech. and he has also published more than twenty research papers in reputed international/national journals and conferences proceedings.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. **M. Zunaid,** Q. Murtaza and S. Gautam, "Energy and Performance Analysis of Multi Droplets Shower Cooling Tower at Different Inlet Water Temperature for Air Cooling Application", *Applied Thermal Engineering*, vol. 121, pp. 1070-1079, 2017. Impact Factor: 3.356.

Energy and Performance Analysis of Multi Droplets Shower Cooling Tower at Different Inlet Water Temperature for Air Cooling Application

Mohammad Zunaid*, Qasim Murtaza and Samsher Gautam

Abstract: This study present development of the two-dimension numerical model in MATLAB, in which mass, momentum, energy, exergy and water droplet trajectory equations are solved simultaneously for predicting the exit conditions of air and water for human comfort. Experimental data obtained from shower cooling tower (SCT) are used to validate numerical model. Ten different diameters water droplet are analyzed. The Rosin Rammler distribution is used to distribute ten different diameter droplets. In the parametric study, inlet water droplets temperature plays a significant role in water droplets and air exit temperature, the efficiency of SCT, convective and evaporative exergy of air, exergy of water and total exergy destruction of the system. Results show the efficiency of SCT increases with increase in the inlet water temperature and largest part of total exergy of the system destroyed at the top of SCT. The mathematical model developed has potential application in producing exit condition of air and water for human comfort.

For details refer to https://doi.org/10.1016/j.applthermaleng.2017.04.157

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Biography

Dr. Pravin Kumar

Department of Mechanical Engineering

Dr. Pravin Kumar is working as an Assistant Professor in the Department of Mechanical Engineering, Delhi Technological University (formerly Delhi College of Engineering), Delhi, India. He has also worked as Associate Professor in the Department of Management Studies, IIIT Allahabad for one year (on Lien, 2013-14). He has more than 17 years of teaching and research experience. He received his M.Tech. degree in Industrial management from the IIT (BHU) Varanasi, and Ph.D. degree in Supply Chain Management from IIT Delhi, India. He has received the Best Case Study Award of the year 2007-08 by National Council of Indian Institution of Industrial Engineering, Mumbai and published the article in "Industrial Engineering Journal". He is author of books on Engineering Economics published by John Wiley, Delhi, 2012, Industrial Engineering and Management published by Pearson Learning, Delhi, 2015 and Basic Mechanical Engineering published by Pearson Learning, Delhi, 2013. He has research interests in Supply Chain Management, Quality Management, Operations Management and Modeling in Management. He has published more than 50 research papers in International Journals and Conferences. His h-index as reported by Google Scholar is 10.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	02

1. **P. Kumar**, R. K. Singh, and A. Vaish, "Suppliers' Green Performance Evaluation using Fuzzy Extended ELECTRE Approach", *Clean Technologies and Environmental Policy*, vol. 19, no. 3, pp. 809-821, 2017. Impact Factor: 3.331.

2. **P. Kumar**, R. K. Singh, and K. Kharab, "A Comparative Analysis of Operational Performances of Cellular Mobile Telephone Service Providers in the Delhi Working Area using an Approach of Fuzzy ELECTRE", *Applied Soft Computing*, vol. 59, pp. 438-447, 2017. Impact factor: 3.811.

Suppliers' Green Performance Evaluation using Fuzzy Extended ELECTRE Approach

Pravin Kumar*, Rajesh Kumar Singh, and Anurika Vaish

Abstract: In the present context of the globalized market, sustainable manufacturing has become a major concern for all organizations. The sustainable manufacturing system includes economic, environmental, and social sustainabilities. Green manufacturing enhances the environmental sustainability but, it also affects the economic and social sustainabilities. The compulsion to follow the environmental rules and regulation in any business activity has increased the awareness for the use of green products, recyclable materials for packaging, reduction of carbon emission, etc. Due to the involvement of extra costs in green manufacturing, some ignorance in the implementation of green practices may be observed. To ensure sustainable systems, selection of suppliers based on green performance measures is very important. This study evaluates the suppliers' performances based on Green Practices as follows: environmental management and pollution control, cost, quality, and flexibility using the fuzzy-extended Elimination and Choice Expressing Reality approach. This approach helps the managers to incorporate the linguistic decision of the decision makers and convert it into quantitative scale. This method is used to eliminate and outrank the poor performers. As poor performers are outranked, this approach helps to select the most suitable green suppliers as per organization's requirement.

For details refer to https://doi.org/10.1007/s10098-016-1268-y

*Corresponding author.

A Comparative Analysis of Operational Performances of Cellular Mobile Telephone Service Providers in the Delhi Working Area using an Approach of Fuzzy ELECTRE

Pravin Kumar*, Rajesh Kumar Singh, and Karishma Kharab

Abstract: The purpose of this research paper is to develop a framework to analyze the operational performance of cellular mobile telephone service providers (CMTSP) in the Delhi working area, India. Delhi area has the highest teledensity in India. The present study uses a fuzzy ELECTRE (Elimination and Choice Expressing Reality) approach to compare the performance of cellular mobile telephone service providers. The data for the analysis have been taken from the Telecom Regulatory Authority of India (TRAI), April–June 2015. Most of the data vary from one month to another. Therefore, these small ranges of variation in the data are incorporated in this study using the fuzzy number. Total six major telecom service providers are considered in this analysis. The findings of the study suggest that the performances of Airtel and Reliance communications are in the first rank; Vodafone and Idea are in the second rank; Aircel is in the third rank, and Mahanagar Telephone Nigam Limited (MTNL) is outranked by all the other service providers. The performance is analyzed on the basis of three major parameters consisting six criteria, i.e. network availability (Base Transceiver Station accumulated downtime), connection accessibility (call setup success rate, channel congestion, and traffic channel congestion), and connection retainability (call drop rate and connection with good voice quality). It has been observed that MTNL is outranked due to the highest traffic channel congestion and highest call drop rate. Using this framework, a decision maker can develop a strategy to improve the performance by benchmarking operational parameters. The research analysis is limited to only GSM (Global System for Mobile communication) service providers in the Delhi working area, including Ghaziabad, Noida, Faridabad, and Gurgaon.

For details refer to https://doi.org/10.1016/j.asoc.2017.06.019

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Biography

Prof. Rajesh Kumar

Department of Mechanical Engineering

Prof. Rajesh Kumar is currently working 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 more than 17 years experience of teaching & Research in the fields of Thermodynamics, Refrigeration & Air conditioning, Renewable energy and Fluid Mechanics. He has guided and 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 9(Google scholar). He is also a reviewer of Elseveir, Inderscience, Springer, Wiley. He is a life member of Solar Energy Society of India and fellow of Institution of Engineers. He has also performed various administrative duties including Head of the Department (in MITS Gwalior), Associate Head (Mechanical Engg. Department DTU), Vice-chairman of B.Tech. admission committee, member of curriculum revision committee, member of discipline committee, member of organizing committee of conference & FDP etc.

Award Summary & Publications Details

Category Title	No. of Publications
Commendable Research Award	01

1. U. Sahoo, **R. Kumar**, P.C. Pant and R. Chaudhary "Development of an Innovative Polygeneration Process in Hybrid Solar-biomass System for Combined Power, Cooling and Desalination", *Applied Thermal Engineering*, vol. 120, pp. 560–567, 2017. Impact factor: 3.634.

Development of an Innovative Polygeneration Process in Hybrid Solar-biomass System for Combined Power, Cooling and Desalination

Umakant Sahoo, **Rajesh Kumar***, Pradeep Chandra Pant and Rajiv Chaudhary

Abstract: In the polygeneration process simultaneous production of power, vapor absorption refrigeration (VAR) cooling and multi-effect humidification and dehumidification (MEHD) desalination system from different heat sources in hybrid solar-biomass (HSB) system with higher energy efficiency take place. It is one of the solutions to fulfill energy requirements from renewable sources and also helps in the reduction of carbon dioxide emissions. The VAR cooling system operates using the extracted heat taken from turbine and condenser heat of the VAR cooling system is used in desalination system for production of drinking water as per demand requirement. Though the production of electricity decreases due to extraction of heat from turbine for VAR cooling and desalination, the complete system meets the energy requirements & increases the primary energy savings (PES). The thermodynamic evaluation and optimization of HSB system in polygeneration process for combined power, cooling and desalination is investigated to identify the effects of various operating parameters. Primary energy savings (PES) of polygeneration process in HSB system is achieved to 50.5%. The energy output is increased to 78.12% from this system as compared to simple power plant.

For details refer to https://doi.org/10.1016/j.applthermaleng.2017.04.034

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F.No.: DTU/IRD/544/2017/ 1267 **Dated : 11-01-2017**

NOTICE

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

The cash awards will be presented to researchers in the recognition of importance of the published research work and to celebrate the individual excellence in research. The publications considered must be listed in SCI or SCI expanded. The awards will be granted for the journal papers published in each year (1st January-31st December, published along with DOI, pagination and year of publication). Only the first author and/ or the corresponding author shall be eligible to apply for the award. A call will be circulated annually and the entry form consisting of published research papers qualifying the selection criteria must be completed and returned. The publication made in the journals, which seeks publication fee, shall not be considered for cash awards (irrespective of the listing in the publication houses specified in the following lists).

1 DEFINITIONS:

i. "University" shall mean Delhi Technological University (DTU), Delhi.

ii. Paper: Any publication appearing in journal namely "……" excluding letters to the editor and editorials. The publication must be electronically available online.

iii. University Faculty: An individual who is a regular faculty of the Delhi Technological University.

iv. University Student: An individual who is registered for any degree in the Delhi Technological University.

v. Researcher: An individual who is either a university faculty or a university student.

2. AWARD CATEGORIES & SELECTION CRITERIA:

A) Outstanding Research Awards

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

Selection Criteria: The paper must be a SCI/ 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 certificate of merit.
Selection Criteria: The paper must be a journal paper of impact factor at least one, indexed in SCI 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
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 certificate of merit.
Selection Criteria: The paper must be a journal paper of impact factor at least one, indexed in SCI or SCI expanded and published in the following:

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

18. American Institute of Physics
19. IOP Publishing Ltd.
20. Massachusetts Medical Society
21. IOS Press
22. Princeton University Press
23. Society of Industrial and Applied Mathematics
24. Proceedings of National Academy of Sciences of the USA

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 the university faculties, 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 university faculties and the university students, then university faculty (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 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.

The guidelines be implemented with effect from 1st January 2017.

-S/d-
(Anil Kumar)
Asstt. Registrar(IRD/Acad.-PG)

F.No.DTU/Reg/Notification/2016-17 Dated :

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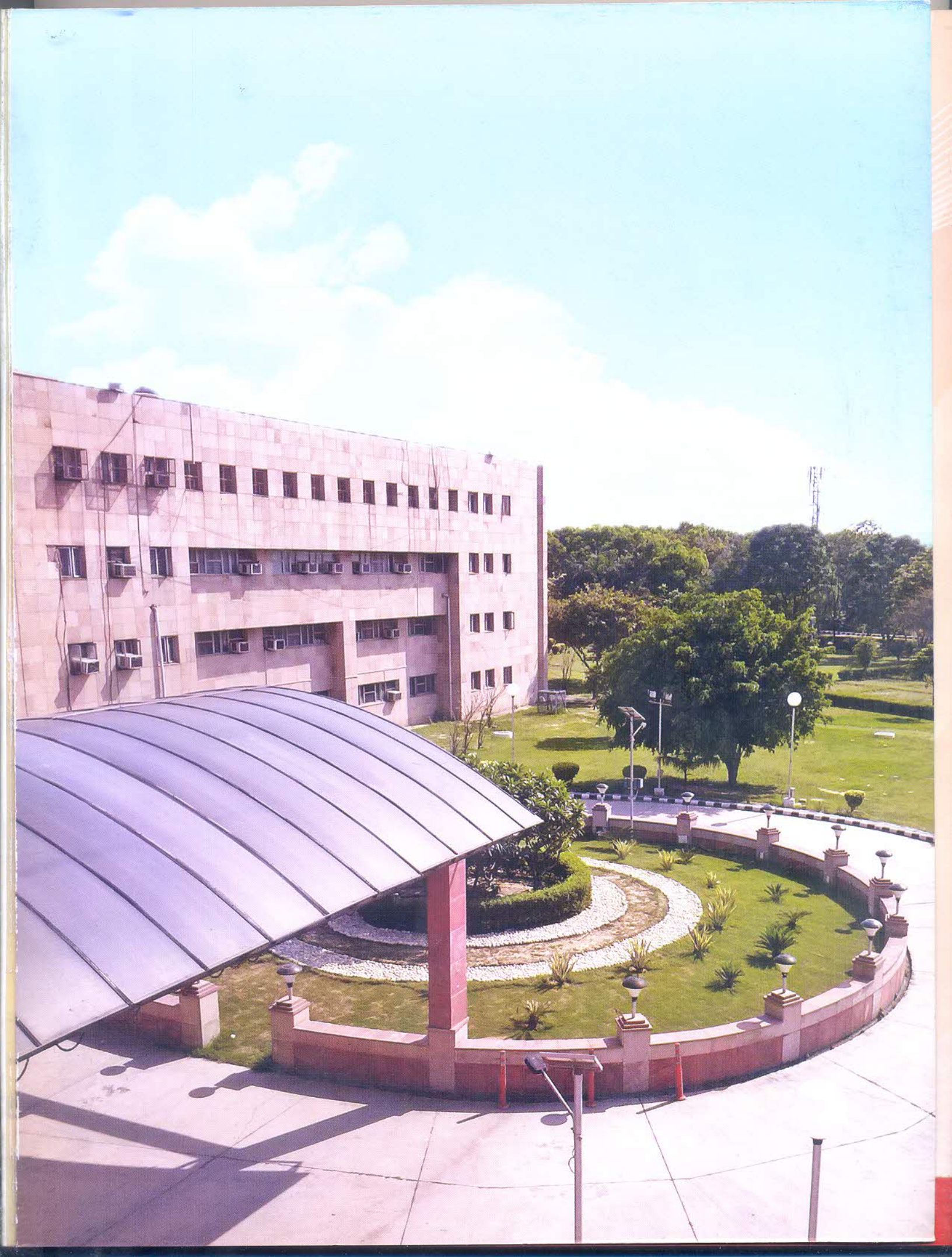
S/d-
(Anil Kumar)
Asstt. Registrar(IRD/Acad.-PG)



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