A simple, facile approach for the large scale synthesis of CuO nanorods, nanoflowers and nanowires using wet chemical route and its growth mechanism

A

Project Report

Submitted in partial fulfillment of the requirement for the award

Of the degree of

MASTER OF TECHNOLOGY

In

NANOSCIENCE AND TECHNOLOGY

By

VISHWESH SHUKLA

Roll no. 2K14/NST/19

Under the Guidance of

Dr. Nitin K. Puri

Assistant Professor

DEPARTMENTNT OF APPLIED PHYSICS

DELHI TECHNOLOGY UNIVERSITY

NEW DELHI – 110042

JUNE - 2016

Department of Applied Physics

Delhi Technological University

Delhi

CERTIFICATE

This is to certify that Mr. Vishwesh Shukla, a student of final semester M. Tech. (Nanoscience and Technology), Applied Physics Department, during the session 2014-2016 has successfully completed the project work on **"A simple, facile approach for the large scale synthesis of CuO nanorods, nanoflowers and nanowires using wet chemical route and its growth mechanism"** at DTU, Delhi and has submitted a satisfactory report in partial fulfillment for the award of the degree of Master of Technology.

The assistance and help received during the course of investigation have been fully acknowledged. He is a good student and we wish him good luck in future.

Dr. Nitin K. Puri
Assistant Professor,
Applied Physics Department
Delhi Technological University
Delhi - 110042

Prof. S.C. Sharma
HOD
Applied Physics Department
Delhi Technological University,
Delhi - 110042

Candidate Declaration

I hereby declare that the work which is being presented in this thesis entitled **"A simple, facile approach for the large scale synthesis of CuO nanorods, nanoflowers and nanowires using wet chemical route and its growth mechanism"** is my own work carried out under the guidance of Dr. Nitin K. Puri, Assistant Professor, Delhi Technological University, and Delhi.

I further declare that the matter embodied in this thesis has not been submitted for the award of any other degree or diploma.

Date:

Place: New Delhi

Vishwesh Shukla

Roll No. -2K14/NST/19

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Vishwesh Shukla
M. Tech. NST
2K14/NST/19

ABSTRACT

We report the large scale synthesis of nanostructured copper oxide (CuO) synthesized by cost effective and simple wet chemical route. Nanorods and Nanoflowers and Nanowires have been uniformly grown on Cu foil by the oxidation of Copper. Their growth mechanism has been reported to understand the optimal parameters for controlled growth via a simple coordination self-assembly method on substrates. The composition, morphology and structural identity have been characterized by Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Energy-Dispersive X-ray spectroscopy (EDX), Fourier Transform Infrared Spectroscopy (FTIR) and Transmission Electron Microscope (TEM). These characterizations clearly show formation of CuO nanorods and nanoflowers having diameter in the range of 16-30 nm. The synthesized structures will have the potential applications as gas sensors, an active electrode material for Li-ion batteries, heterogeneous catalysts, field emission [FE] emitters and solar cells etc.

Key words: Growth mechanism, CuO nanostructures, self-assembly, chemical method

List of publications

Vishwesh Shukla, Kamal Arora, Deepika Sandil, Saurabh Srivastava and Nitin K. Puri, "A facile synthesis approach and growth mechanism: CuO nanoarchitectures grown on Cu substrate" **Advanced materials letters** (Communicated-June 2016).

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