Jabalpur Engineering College
Jabalpur, M.P. India

MHRD
Govt. of India
सत्यमेव जयते

GIAN-MHRD, Government of India Sponsored Workshop-Course On

"NANOMATERIALS: BY DESIGN FOR ENERGY APPLICATIONS"

(June 21, 2020-June 25, 2020)

Overview:

Nanostructure materials are gaining importance for energy generation and storage, thus offering new possibilities with desired, 'engineered' properties for energy-related applications. As the size of the materials comes in regime of nanoscale, photon emission, electron transport and phonon scattering processes change drastically compared to the bulk material. The proposed course will provide the overall view to beginners how to model property of nanomaterials and correlate it with experiments for energy-related applications including energy and fuel generation (photovoltaic's, thermoelectric, catalysis) and energy storage (fuel cells, batteries, and super-capacitors).

Objective:

The primary objectives of the course are as follows:

1. To provide fundamental understanding of quantum behaviour of nanomaterials.
2. To describe synthesis and characterization methods for nanomaterials.
3. To discuss applications of nanomaterials in energy-related area.
4. To develop high quality course material for students, researchers and teachers, that will induce motivation toward research related to nanomaterials for energy-related applications.

Course Schedule:

Lecture		Topic
Day1 : **Nanomaterials : Synthesis and Characterization**	**Lecture I**	Synthesis and characterization.
	Lecture II	
	Tutorial 1	Problem solving session: X-ray diffraction : Analysis and calculation of grain size, strain, crystal plane etc
Day 2: **Nanomaterials: Applications for Electrochemical batteries, Photovoltaic cell, and Hydrogen storage**	**Lecture III**	Discussion of requirements for Electrochemical batteries. Photovoltaic cell, hydrogen storage devices
	Lecture IV	
	Lecture V	
	Tutorial 2	X-ray diffraction: Calculation of Lattice parameter by Rietveld analysis.
Day 3: **Nanomaterials: Physics at the Nanoscale (Quantum Mechanics)**	**Lecture VI**	Quantum mechanics and Materials properties
	Lecture VII	
	Tutorial 3	Electrochemical characterization – Cyclic voltametry, Chrono-potentiometry, Chronoamperometry
Day 4: **Nanomaterials: Prediction of Properties for Energy Applications**	**Lecture VIII**	Theoretical tools to design Nanomaterials
	Lecture IX	
	Lecture X	
	Tutorial 4	Solar cell, Batteries, Super capacitors: Impedance Spectroscopy Data fitting and analysis
Day 5: **Nanomaterials: Next-generation devices related to Energy Applications**	**Lecture XI**	Future – next generation devices
	Lecture XII	
	Tutorial 5	Practice session to study multiple structural models, volumetric data, and crystal morphologies.

Number of participants for the course will be limited to forty.

Who can attend:

- Executives, engineers and researchers from manufacturing, service and government organizations including Research and Development laboratories.

- Students at all levels (B. Tech. / M. Sc. /M. Tech./ M. Phil / Ph. D.) or Faculty from reputed academic institutions and technical institutions.

Procedure to apply for course:

The applicant are required to get themselves register on GIAN web portal (http://www.gian.iitkgp.ac.in) to apply for any number of GIAN courses as and when necessary. Participants then needs to select "Nanomaterial: By design for energy applications" course from the list at course registration. Subsequent registration for this course will have to be done with Jabalpur Engineering College, Jabalpur by submitting the registration form as attached with the brochure to the course coordinator by online and offline mode. Their need to enclose the receipt of the transition details along with registration form.

The course registration fee must be paid through NEFT at State Bank of India, GEC Branch, Jabalpur, **A/c No.10049870101**, IFSC: SBIN0004801 for taking the course is as follows:

Participants from abroad: US $500
Indian Industry/ Research Organizations/Faculty: Rs. 2,000/-
Indian Academic Institutions (Students): Rs. 1,000/-
Student and faculty from host institution: Nil

The above fee includes all instructional materials, computer use for tutorials and free internet facility.

Accommodation, food and transport of course participants will be borne by the individual course participants themselves. On the request the participants will be provided accommodation on payment basis in the Guest House/Hostel.

Important Dates:

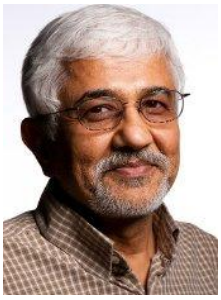
Registration in GIAN Portal and Receipt of Course registration form to course Coordinator:

30 May 2020

Intimation to the shortlisted participants: **05 June 2020**

The Faculty:

Foreign faculty



Ravindra Pandey is Professor and Chair of Physics at the Michigan Technological University, Houghton, MI. Pandey received his education at Hari Singh Gaur University, Sagar, National Physical Laboratory, Delhi, Atomic Energy Research Laboratory, Harwell, UK and University of Manitoba, Winnipeg, Canada. He has participated in multi-disciplinary efforts (theoretical and experimental) to build the programs in novel nanostructures, and application of chalcopyrite semiconductors as the next generation optoelectronic materials with the industrial and national laboratories, and is the author of more than 150 publications. He has also co-organized and participated in several international conferences in the areas of Materials Physics and Nanoscale Science. Pandey is Fellow of American Physical Society.

Course coordinators (Host faculty):

Dr. Ruchi Nigam is currently working as Head of Department of Applied Physics, JEC, Jabalpur. Her subject of interest includes Nanosciences and Space Physics. She has more than 10 publications. Presently, Dr. Nigam is working on an project sponsored by National project implementation unit, India.

Dr. Bhavana Singh is working as Assistant Professor in the Department of Applied Physics, JEC, Jabalpur, M.P. India. Her research interests include synthesis and characterization of semiconducting nano-oxide thin films and chalcogenide nanoparticles. She has published more than 20 research papers in international journals of repute. Presently Dr. Bhavana is working on a project sponsored by National project implementation unit, India.

Course Coordinators :
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Local Coordinator (GIAN)

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Global Initiative on Academic Network (GIAN)

Jabalpur Engineering College Jabalpur

A Short Course On

NANOMATERIALS: BY DESIGN FOR ENERGY APPLICATIONS

June 21th to June 25th, 2020

REGISTRATION CUM ACCOMODATION REQUEST FORM

(To be submitted by the candidates to the course coordinator after one time registration in the GIAN portal. This form should reach by June)

1. Name (Block Letters): ..... M/F: .....
2. Registration ID generated by GIAN Portal: .....
3. Participant Type: I. Student:
   Course (B.E/ B. Tech. /M.C.A/ M. Tech. / M. Sc. /M.Phil. /Ph.D.): .....
   Branch & Semester: .....
   Student ID Number: .....
   Institute: .....
   II. Faculty:
   Designation: .....
   Department: .....
   Organization: .....
   III. Industry:
   Designation/Professional Title: .....
   Organization: .....
4. Address: .....
   .....
   .....

   Tel.: ..... . Mobile: .....
   E-mail: .....

5. Accommodation Required (Yes/ No): .....

The Registration fee of Rupees .....has been paid via NEFT.
The transfer detail as Ack. No. .....date..... .....

Date: Signature

Forwarded:

Head of the Institution (With Seal)