Semiconductors and allied electronic materials, glass and ceramics, polymers, composites, and nanofluids are the main research areas. The Centre offers a four semester M. Tech. course on Materials Science and Engineering with specialization in either of the above three categories of the materials and applications. It offers more than a dozen UG/PG courses on "materials processing, characterization and structure-property correlation" to other Departments/Centres of the Institute. The faculty members are highly experienced and renowned in the research and teaching of advanced materials and materials science.

ELIGIBILITY

The teachers, engineers, technologists, and scientists respectively from the AICTE affiliated colleges/ universities/NITs, IITs, industries, and R & D organizations with background of engineering, materials science, as well as pure solid-state physics/chemistry and related fields may participate in this short-term course program. A background of materials science will be preferred for better understanding of the course.

HOW TO APPLY

Send your bio-data in the enclosed proforma. Important publications and other achievements/ recognition related to the topic may be sent along with the bio-data. It will help in selecting the candidature. The number of the participants will be limited to 30. The selection will be made on the basis of qualifications and experience.

SPECIAL LECTURES

Eminent professors/scientists with expertise in nanomaterials, composites and applications from leading institutions, universities, and laboratories will deliver the lectures in this short-term course. Experts from industries will be invited. The language of the communication will be English.

ACCOMMODATION - LOCAL HOSPITALITY

The participants will be provided with furnished double bed room accommodation in our continuing education programme (CEP) Guest-House in the IIT campus. On special request, limited number of accommodation may be arranged in the Technology Guest House but on personal basis. Breakfast, lunch and dinner will be served in the Guest-house. However, the participants may take their food outside if they so desire.

REGISTRATION and FEES

Category-1:

All the participants have to be registered for the short-term course. The teachers from the AICTE sponsored colleges/universities /NITs/IITs need not pay for the registration. The selected candidates will be reimbursed 2nd class to and fro railways fare via shortest route. Also accommodation and food will be free from additional charges for them. To ensure the registration, the participants need to submit Rs.1500/- (by a check addressed to CEP-STP, IIT Kharagpur) as a security deposit.

Category-2:

The participants from industries and R & D organizations have to pay Rs 21,000/- per person as the registration fee. This includes the basic charges for the food, lodging and lecture materials. The registration fee may be paid by demand draft in favour of CEP-STP payable at IIT Kharagpur.

LAST DATE OF APPLICATION

The complete application must reach the coordinator before August 5, 2014. The selected participants will be informed before August 10, 2014.

LOCATION and WEATHER

Kharagpur is well connected by railways with all major centers of India. The railways station holds the distinction of the longest platform in the world. It is situated 116 km southwest to Kolkata and is very well connected by superfast, fast, and local trains. There are taxis, 3-wheelers, and cycle rickshaws available at the Kharagpur railway station throughout the day and night. IIT campus is situated 4 km away from the railway station. The approximate fares are taxi-Rs 130/-, 3-wheeler-Rs 80/-, and cycle rickshaw-Rs 70/-.

In September, the weather at Kharagpur is very pleasant with cool fresh air and greenery all around. The day temperature is around 20-30 C and at night it comes down to 20-25C. Unless it is raining the sky is mostly pleasant sunny and clear.

TO SUPPORT R & D IN ACADEMICS IS OUR MOTTO

CONTACT ADDRESS

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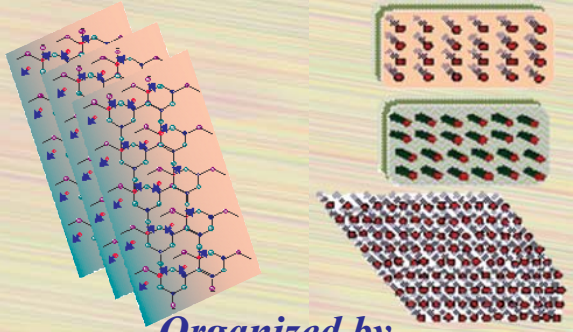
Materials Science Centre
Indian Institute of Tech1nology
Kharagpur-721 302

Fax: (091) 3222-255303/282700
Telex: 06401-201 ITKG IN

AICTE SPONSORED SHORT TERM COURSE ON

HYBRID INORGANIC-ORGANIC NANOCOMPOSITES FOR PHOTONICS, ENERGY AND ELECTRONIC DEVICES: INDUSTRIAL APPLICATIONS

September 01-12, 2014



Organized by

Continuing Education Programme (CEP),
Indian Institute of Technology,
Kharagpur
in
MATERIALS SCIENCE CENTRE
INDIAN INSTITUTE OF TECHNOLOGY
KHARAGPUR-721 302, W.B.

1. THEME OF THE COURSE :

An inorganic-organic hybrid nanocomposite, which can be built-up with a unique kind of a combination of two or more distinct material phases with a joint interface, has made tremendous progress over the recent past of a couple of decades due to progressively growing advances in functional materials, materials science, materials engineering, and ultimately materials technologies in different sectors of sciences, defence, space programs, medicals, agriculture, environment pollution control, automobiles, energy, and industries. Such materials lead to integrate electron-phonon band structure, spintronics, and ferroics with microscopic interactions between the pertinent phases and energy carriers. These are the cutting-edge multifunctional materials of rapidly growing future. Some of the identified applications include civil structures, aerospace engineering, armaments, medical tweezers, cutting tools, electronic devices and components, photonics, different kinds of sensors, spin valve and spin polarizers, ferrofluids, biomaterials, drugs and drug delivery systems, catalysts, porous membranes, solid electrolytes, optical and optoelectronic materials, MEMS, magnetic or optical data storage systems, ferroelectrics, energy-storage and devices. Newer achievements in nanomaterials or hybrid nanocomposites have made a tremendous impact on quality production of high performance materials, components and devices, and basic understanding of their physical and chemical properties and in turn an open scope of newer applications in engineering, medicines, defence, and other disciplines.

A conventional particulate material (a metal/alloy, ceramic, polymer, or composite) made-up of a self-confined dimension that limits to a few tens of nanometers differs markedly from that of the equilibrium bulk dimension in a way that a significant fraction of the atoms occupies the surface or surface boundaries in an altogether different thermodynamic state. As such, these kinds of surface atoms often suffer from (i) a lower co-ordination number, (ii) a lower co-ordination symmetry, (iii) a lower atomic density, (iv) a larger interatomic distance than the core atoms, and (v) a nonzero value of the average charge. The atoms and/or electronic charges adapt redistribution in minimizing the internal energy and maximizing the entropy in a metastable energy state•'3f. Thus, a specimen of such tiny structures or self-assemblies often involves a manifested value of enthalpy and/or volume with a wide energy-entropy phase diagram relative to the bulk values. A high-energy phase transformation might take place to cope with the local perturbations in the energy carriers. It reflects in instantaneously modified electronic band structure with tailored functional properties. As a result, it is well argued that a nanostructured material {of effective dimension 0, 1 or 2), which in general can span over 1-100 nm scale depending on its shape and surface structure, altogether nurture unique properties in which neither quantum chemistry nor non-classical laws of physics hold in the virginal forms of the basic variables.

A production of the value aided materials for industrial applications stays a big challenge today to deliver high performance requirements with desired size, shape, surface topology, and functional properties. Functionalized properties and their joint performance in a material or its device depend on (i) average crystallite, particle, or pore size (also morphology), (ii) distribution of crystallites and/or particles (or pores), (iii) average composition of the sample, (iv) degree and length of chemical homogeneity, (v) local structure of the basic surface or surface interface, (vi) microstructure of pores if any, (vii) agglomeration, and (viii) average distance between the basic structures, and (ix) macroscopic interactions between basic structures (or phases in a composite).

In view of these valid technical points, the established synthetic procedures, the basic knowledge, and mechanism of synthesis and/or fabrication of different kinds of nanostructured materials must be developed with the structure-property correlation. A clear view has to be achieved for their applications in energy, medicines, defense, space technology, photonics, and chemical, structural and electronic industries. In a well defined program to address or resolve some of these technological issues, it is a timely approach to hold a short-term winter school in this discipline on “Hybrid inorganic-organic nanocomposites for photonics, energy and electronic devices: Industrial applications” with a special emphasis on anchoring the structure-property and industrial applications. This is in continuation to similar short-term courses organized earlier by the coordinator at Materials Science Centre, Kharagpur, during 1999, 2006, 2007, and 2013.

2. The Major Disciplines:

The present course will cover the following major topics with an especial emphasis on industrial applications of the materials and products.

- Inorganic-organic hybrid nanocomposites, high-energy interfaces, and their industrial applications.
- Need of scaling down size of selective materials to a critical nanometric scale in functionalizing useful properties.
- Different kinds of advanced nanocomposites for applications in photonics, energy, structure and magnetic, ferroelectric, and electronic devices.
- Graphene based supercapcitors and their applications.
- Nanoporous composites in hydrogen storage and other applications.
- Biocomposites and applications.
- Nanocomposites for gas sensors and reaction catalysts.
- Methods for synthesis of composite powders, films and other engineering shapes.
- Soft chemistry methods for devising multiferroics and devices.
- High quality multiferroics, phosphors and devices from glasses.
- Microwave sintering of nanocomposites.
- Characterization in relation to the crystal structure, microstructure, and magnetic, electronic, ferroelectric, optical and mechanical properties.
- Role of particle size, morphology, and surface structure in structural, optical, electrical/dielectric, ferroelectric, energy, photonics and other useful properties.
- Simulation/modeling of thermal stability, reactivity, phase transformation, phtonics, and other properties in nanostructures and assemblies.

ABOUT IIT KHARAGPUR AND MATERIALS SCIENCE CENTRE

IIT Kharagpur is the oldest and largest amongst the sister institutions. Teaching and research in all major branches of engineering as well as science are conducted here with 19 different Departments, 12 Centres and 4 Schools. Selected students from all over the Country as well as from abroad come here for their undergraduate and postgraduate studies. In addition to the regular academic programmes, we have Continuing Education Programme, Science and Technology Entrepreneur Park (STEP), and Technology Foundation. There is a full-fledged residential campus for all students, faculty members, and other employees of the Institute. Both the institute and residential campus are full of lovely natural greenery with variety of trees, plants and green surroundings.

The Materials Science Centre is about 41 years old and is actively engaged in high level teaching, Ph. D. Programs, and R & D of advanced materials and their science and technology.

REGISTRATION FORM

AICTE sponsored short term course on

"Hybrid Inorganic-organic Nanocomposites for Photonics, Energy and Electronic Devices: Industrial Applications"

September 01-12, 2014

Full Name: _____

Designation: _____

Highest qualification: _____

Department: _____

Postal Address: _____

_____

Tel./Mob.:_____

E-mail:_____

Gender:_____M/F

Whether the employing Institute is

AICTE approved: YES / NO

Accommodation required: YES / NO

_____

Signature of the candidate

Date_____

_____

Signature and Seal of Head of Organization

……

For others (Category-2):

Draft No._____ dated _____

Of amount Rs. _____ drawn on

_____Bank

Fill out above information and send it to the address shown on the reverse side (either soft copy or hard copy) along with your brief bio-data.