Nanochemistry:
From Preorganized Molecular Architectures
to Functional Materials

Overview
Conceptual advancements in the chemistry of nanomaterials in the past two decades has estab-
lished “Nanochemistry” as an important and inte-
gral part of materials science curriculum. This
course will present the inherent relationship be-
tween synthetic and material chemistry and
demonstrate how chemically processed nanopar-
ticles, nanowires and films of different metal ox-
ides open up new vistas of material properties,
which can be transformed into advanced material
technologies.

This course, suitable for Masters and PhD stu-
dents, will illustrate that an advanced knowledge
of chemistry enables purpose-driven synthesis
and modification of functional nanomaterials. Im-
plications of chemistry as an innovation motor are
now visible for knowledge leap forward in various
sectors such as materials engineering for energy,
health and security. In order to provide an in-
depth and up-to-date account on the interdiscipli-
ary character of nanochemistry research, spe-
cial emphasis will be given to chemical strategies
enabling surface modification of nanostructures
and necessity to develop synthetic protocols for
conjugation of inorganic and organic components
in single nanomaterials.

The major topical areas include (i) targeted de-
velopment of chemical precursors for nano-
materials synthesis (ii) fabrication of thin-films
(chemical and physical vapor and atomic layer
deposition techniques) and nano-structures (sol-
gel, microwave, solvothermal and electrospinning
methods) and (iii) integration of nanomaterials
into devices.

Dates for the course
19th December to 23rd December 2016

Host Institute
IIT(BHU), Varanasi

No. of credits
1

Maximum No. of Par-
ticipants
40

Description
The foremost objective of this course would be to
provide a thorough basis for theoretical and exper-
imental concepts for nanomaterials synthesis, func-
tionalization and scaling up. Furthermore, potential
applications of nanostructured materials in energy
(production and storage) and health sectors will
also be discussed.
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1) Introduction to Nanomaterials and Nanochemistry
2) Nanomaterials Synthesis - I
3) Nanomaterials Synthesis - II
4) One Dimensional Materials
5) Technological Applications of Nanomaterials
6) Business of Chemical Nanotechnologies: An Entrepreneurial Approach
7) Interactive Workshop on “Advanced Materials: Current Break Throughs and Future Developments”

Who should attend

- Scientists/Engineers from Industry and government R&D laboratories, engineering/science departments
- Students at the levels MSc/MTech/PhD
- Faculty members from reputed academic and technical institutions of India.

Course registration fee

The participation fees for taking the course is as follows:

i) Student Participants INR 1000/-
ii) Faculty Participants INR 2000/-
iii) Government Research Organizations INR 3000/-
iv) Industry Participants INR 5000/-
v) Foreign Participants USD 500

Accommodation

The participants may be provided with hostel accommodation, depending on availability, on payment basis.
Sanjay Mathur is Director of the Institute of Inorganic Chemistry at the University of Cologne in Germany. He is the Director of the Institute of Renewable Energy Sources at the Xian Jiao Tong University, Xian, China and a World Class University Professor at the Chonbuk University in Korea. He also holds Visiting Professorships at the Central South University, China, Tokyo University of Agriculture and Technology, Japan and National Institute of Science Education and Research (NISER), India. His research interests focus on application of nanomaterials and advanced ceramics for energy technologies. He holds ten patents and has authored/co-authored over 400 original research publications and has edited several books. He is a Titular Member of the International Union of Pure and Applied Chemists (IUPAC) and a member of the ISO Technical Committee on Nanotechnologies. He serves as the Editor for NanoEnergy, Journal of Electroceramics, and as the Principal Editor of J. Mater. Research. He is also an Associate Editor for International Journal of Applied Ceramics Technology, International Journal of Nanoscience and Nanomaterials. He is also on the Editorial Boards of journals International Journal of Nanotechnology, Materials, Journal of Ceramic Science and Technology, and NanoEnergy.

He is an Academician of the World Academy of Ceramics. A Fellow of the American Ceramics Society, Mathur also acts as the “International Ambassador” of the University of Cologne. He was given the Global Star Award of the ECD of American Ceramic Society in 2010. He was recently (2015) honored with the Lee Hsun Award of the Chinese Academy of Science, China. He is the recipient of the 2015 Surface Innovator Award (AkzoNobel) of the Society of Surface Protection and Paints. He is the recipient of the 2016 CSIR Presidential Lecture Award of Council of Scientific and Industrial Research, Pretoria, South Africa. He was awarded the Honorary Doctorate of the Vilnius University, Lithuania in 2016.

Dr. Indrajit Sinha is Associate Professor at Department of Chemistry in Indian Institute of Technology (Banaras Hindu University), India. He has 13 years of teaching and 15 years of research experience. He has been working in various aspects of liquid phase synthesis of nanoparticles by precipitation techniques and their characterization, applications of such nanoparticles as nanocatalysts using model reactions and also on analysis of toxic heavy metal removal by nanoadsorbents. Furthermore, to augment the understanding of the mechanisms involved he also works on simulating nanoparticle interactions under various conditions. Besides this, his research interests also include non-equilibrium phase transitions, oscillatory reaction kinetics using kinetic Monte Carlo simulation techniques.