

ADVANCED FUNCTIONAL MATERIALS AND GREEN ENERGY STRATEGIES

Overview

Fast-tracking technological innovation and organizing clean energy technologies are the important factors to decarbonizing the energy sector needed to reduce greenhouse gas emissions and meet global energy targets as well as climate concerns. International Energy Agency (IEA) takes serious efforts to link start-ups, non-profits, corporations, investors and the public sector to showcase innovations across a variety of categories like urban energy transition, clean-tech against climate change, future production and manufacturing, mobility means energy transition, platforms and communities. China and India, in particular, have been among the world's fastest-growing economies over much of the past decade. Although their rates of economic expansion are expected to moderate in the future, they remain important areas of growth in world energy demand throughout the 2012–40 period. IEA believes that the world needs a clean energy revolution in order to break dependence on fossil fuels. Such a revolution would enhance global energy security, promote enduring economic growth and tackle environmental challenges such as climate change. It would break the long-standing link between economic growth and carbon dioxide (CO₂) emissions. But to succeed, it must also be truly global in scope. A community-based research will focus on providing environmentally friendly, renewable, sustainable and affordable energy sources.

In this direction, advanced materials for the production, storage and transmission of energy are the center of such approaches. It is expected that through the providing of information about such materials to the researchers, from interdisciplinary subjects with respect to their synthesis, properties and exploitation, it will be possible to have a direct and positive effect on the energy crises, which is premiering problem in front of the community especially in the developing countries like India.

This proposed program will provide advanced information for the participants and aware them about recent methods for cleaner energy production, its storage and distribution among the community. This information and training will be expected to be delivered through renowned expertise of international repute.

Course Objectives

- To learn the recent advances in the field of advanced materials and their further utilizations in the green energy strategies from eminent experts.
- To provide the lessons regarding the practical problems and their solutions through tutorials in the various aspects of research endeavors including scientific writing, career directions, use of analytical tools, etc.
- To develop an advanced research skills among the stakeholders and to orient them to choose a proper field for their future endeavors.

Modules	ADVANCED FUNCTIONAL MATERIALS AND GREEN ENERGY STRATEGIES 16 th – 20 th October 2023												
You Should Attend If...	<ul style="list-style-type: none"> ➤ UG/PG Students (B.Sc./B.Tech./M.Sc./M.Tech.), Research Scholars, Faculty from reputed academic and research institutions. ➤ Executives, engineers and representatives from industries. 												
Fees	<p>The participation fees for taking the course is as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">UG/PG Student</td> <td style="width: 50%;">Rs. 1,770/- (Rs. 1500+18% GST)</td> </tr> <tr> <td>Research Scholar</td> <td>Rs. 2,950/- (Rs. 2500+18% GST)</td> </tr> <tr> <td>Faculties</td> <td>Rs. 4,720/- (Rs. 4000+18% GST)</td> </tr> <tr> <td>Industrial Representative</td> <td>Rs. 5,900/- (Rs. 5000+18% GST)</td> </tr> <tr> <td>SAARC Countries</td> <td>US\$ 355 = Rs. 29,500/- (Rs. 25,000+18% GST)</td> </tr> <tr> <td>Non-SAARC Countries</td> <td>US\$ 600 = Rs. 49,560/- (Rs. 42,000+18% GST)</td> </tr> </table> <p>Registration fee includes course materials, breakfast, high tea, and lunch only. Accommodation based on payment basis in the SUK guest house/hostel (Limited seats) and hotels</p>	UG/PG Student	Rs. 1,770/- (Rs. 1500+18% GST)	Research Scholar	Rs. 2,950/- (Rs. 2500+18% GST)	Faculties	Rs. 4,720/- (Rs. 4000+18% GST)	Industrial Representative	Rs. 5,900/- (Rs. 5000+18% GST)	SAARC Countries	US\$ 355 = Rs. 29,500/- (Rs. 25,000+18% GST)	Non-SAARC Countries	US\$ 600 = Rs. 49,560/- (Rs. 42,000+18% GST)
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Accommodation	<p>The participants may be provided with hostel accommodation, depending on availability, on payment basis. Request for University guest-house/hostel accommodation may be submitted to email: sdd_chem@unishivaji.ac.in</p> <p>The University guest house or hostel accommodation will be allotted on the basis of room availability and payment according to University rules.</p>												
Registration Procedure	<p>Registration Link: Interested participants can register through following online registration link with electronic transfer payment on or before 10 October 2023.</p> <p>https://sukapps.unishivaji.ac.in/WorkshopConferenceSeminarPro_app/#/login</p> <p>Course website Link: https://www.unishivaji.ac.in/about_suk/Workshop-Seminars-Conference</p>												
Visiting Faculty	<p>Prof. Prashant V. Kamat</p>  <p>Prof. Prashant V. Kamat is a Professor in Department of Chemistry & Biochemistry and Radiation Laboratory, University of Notre Dame, Notre Dame, USA. He is a leading expert in the physical chemistry and material science by developing advanced nanomaterials for cleaner and more efficient light energy conversions. Professor Kamat's research has made significant contributions to four areas: (1) Photoinduced catalytic processes using semiconductor and metal nanoparticles, nanostructures and nanocomposites, (2) Development of light energy harvesting assemblies for solar cells, (3) Utilization of carbon nanostructures (SWCNT and graphene) in solar cells and fuel cells, and (4) Environmental remediations. He has published the huge number of articles in the journals of international repute. In addition to large multidisciplinary interdepartmental and research center programs, he has actively worked with industry-sponsored researches. He has served on many international panels on nanotechnology and energy conversion processes. He is Editor as well as Member of Editorial board of ACS journals.</p> <p>In addition, the representative lectures of this course will be engaged by other eminent scientists from reputed organizations.</p>												
Course Co-ordinator	<p>Prof. S. D. Delekar</p>  <p>Prof. S. D. Delekar is presently working as Professor in Department of Chemistry, Shivaji University, Kolhapur. His research interests include the synthesis and designing of functional nano composites for energy technologies, photocatalytic transformations, biomedical fields. He has been published 100+ research publications, 10+ books/chapters and 10+ Indian patents. In addition. to his PG and Ph.D. degree, he is recipient of fast-track research proposal for Young Scientists under DST-GOI and also completed post-doctoral fellowship at Florida State University, USA as well as summer research fellowship from Indian Institute of Science, Bangalore (India). He has successfully completed the major research projects funded by DST, UGC, RGSTC, etc.</p>												

Schedule of Course

Day 1 (16th October, 2023)	Lecture 1: 1 hrs: Prof. Prashant V. Kamat The Clean Energy Challenge: Net Zero Carbon by 2050 Lecture 2: 1 hrs: Prof. Prashant V. Kamat Nanostructures and Advanced Energy Materials-I: Metal and Semiconductor Nanostructures Lecture 3: 1 hrs: Prof. Prashant V. Kamat Nanostructures and Advanced Energy Materials - II: Excited State Characterization of Semiconductor Quantum Dots Tutorial 1: 2 hrs: Prof. Prashant V. Kamat PhD and Beyond: Laying the Foundation for a Successful Career
Day 2 (17th October, 2023)	Lecture 4 : 1 hrs: Prof. Prashant V. Kamat Directing Energy and Electron Transfer in Semiconductor Nanostructures Lecture 5: 1 hrs: Prof. Prashant V. Kamat Solar Cells-1: Inorganic-organic Hybrid Nano-assemblies for Light Energy Conversion, Liquid Junction Solar Cells Tutorial 2: 1 hrs: Prof. Prashant V. Kamat How Chat GPT & other AI tools are making a change in scientific publishing Tutorial 3: 1 hrs: Prof. Prashant V. Kamat Effective Scientific Writing Lecture 6: 1 hrs: Prof. Satish A. Patil (IISc, Bengaluru) Organic Solar Cells Lecture 7: 1 hrs: Prof. Satish A. Patil (IISc, Bengaluru) Redox Flow Batteries
Day 3 (18th October, 2023)	Lecture 8: 1 hrs: Prof. Prashant V. Kamat Solar Cells-2: Organic-lead Halide based Perovskite Solar Cells Lecture 9: 1 hrs: Prof. Prashant V. Kamat 2D Materials: Graphene and Beyond Lecture 10: 1 hrs: Prof. Prashant V. Kamat Hydrogen Economy-(Photocatalysis): Solar Fuels (H ₂ O splitting, CO ₂ reduction). Tutorial 4: 2 hrs: Prof. Prashant V. Kamat Avoiding Pitfalls in Photocatalysis and Electrocatalysis
Day 4 (19th October, 2023)	Lecture 11: 2 hrs: Prof. Prashant. V. Kamat Challenges and Opportunities in Energy Research Tutorial 5: 1 hrs: Prof. Santosh Haram (SPPU, Pune) Characterization of Solar Cell Performance and Best Practices in Photovoltaic Research Tutorial 6: 1 hrs: Prof. Santosh Haram (SPPU, Pune) Scanning electrochemical Microscopy (SECM) in Energy research
Day 5 (20th October, 2023)	Lecture 12: 1 hrs: Prof. Sagar D. Delekar (SUK) Solar Cells-3: Functional Nanocomposites-based Solar Energy Harvesting Systems Lecture 13: 1 hrs: Prof. Sagar D. Delekar (SUK) MOF-derived Metal Oxides for Supercapacitor Studies Lecture 14: 1 hrs: Prof. Pramod S. Patil (SUK) Nanomaterials-based Composites for Energy Technologies Tutorial 7: 2 hrs: Prof. Sagar D. Delekar (SUK) Determination of Band Structure Parameters using UV-DRS and CV measurements

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