

## One week hands on training programme on **Fabrication and Characterization of Advanced Photovoltaic Devices**

**12<sup>th</sup> -18<sup>th</sup> December, 2022**

Organized by

**Department of Physics, Indian Institute of Engineering Science & Technology (IEST), Shibpur**

Supported by

**DST-IEST Solar PV Hub**

In association with

**Indian Institute of Technology (ISM), Dhanbad**

Under the aegis of

**DST-STUTI Programme, Funded by Department of Science and Technology, Govt. of India**

The one week (12<sup>th</sup>-18<sup>th</sup> December, 2022) hands-on training programme on "**Fabrication and Characterization of Advanced Photovoltaic Devices**" will be held at the Department of Physics, Indian Institute of Engineering Science and Technology, Shibpur under DST (Govt. of India) sponsored 'Synergistic Training program Utilizing the Scientific & Technological Infrastructure (STUTI)' scheme. The workshop aims to provide a flavor of different state of the art fabrication and characterization of advance photovoltaic structures. Hands-on experience of recording data with the samples from the participants and analysis of the data will be arranged in a systematic manner. The participants will have the opportunity to interact with eminent scientists from academia and industry.

Instrumental Techniques	Significance
<p><b>Synthesis and fabrication tools:</b> PECVD, E-beam and RF sputtering, Diffusion furnace (DST Sponsored)</p>	<p>Plasma-enhanced chemical vapor deposition (PECVD) is a process used to deposit amorphous Si, Poly-Si and nano crystalline Si from a gas state on a bulk Si substrate to fabricate advanced solar cell structure. Electron-beam sputtering is a form of deposition in which a target anode is bombarded with an electron beam given off by a charged tungsten filament under high vacuum for deposition of suitable metal, semiconductor or insulating layers. Radio Frequency (RF) Sputtering is the technique used in sputtering suitable target materials to fabricate thin film based photovoltaic devices. Diffusion furnaces are used in semiconductor doping to form a p-n junction which is the basic building block of a solar cell structure.</p>
<p><b>Spectroscopic analysis:</b> Fourier Transform Infra Red (FT-IR) Spectroscopy, UV-VIS Spectroscopy, Photo luminescence (PL), Time-Correlated Single Photon Counting (TCSPC) (DST-FIST Sponsored)</p>	<p>FT-IR Spectroscopy is the instrument used to detect chemical bond present in the given thin film sample. UV-VIS is a very useful technique used to obtain absorption spectra to find out the absorption edge and optical band gap of a given material. Photoluminescence (PL) is light emission from any form of matter after the absorption of photons used to measure the purity and crystalline quality of semiconductors and to measure its optical band gap. Time-Correlated Single Photon Counting (TCSPC) is a well known and reliable technique to measure excited-state lifetime and other time-resolved properties of luminescent material.</p>
<p><b>Structural analysis:</b> Powder X-Ray Diffraction (PXRD) (DST-FIST Sponsored) And Dynamic Light Scattering (DLS)</p>	<p>Powder XRD is a technique used to determine the crystal structure of a solid material. DLS is a technique used to determine the particle size, zeta potential, molecular weight etc. in colloidal sample.</p>
<p><b>Electrical characterisation:</b> IV-CV measurement, Solar cell parameters measurement</p>	<p>Current-Voltage (IV) measurement for a solar cell characterization particularly under solar spectrum (simulated) is the most important measurement that characterizes the quality of a solar cell. This measurement gives the efficiency, fill factor, external quantum efficiency. Capacitance-Voltage (CV) measurement provides the quality of the junction of a solar cell.</p>

### Contact Persons

From IIT (ISM)	From IIT (ISM)	From IEST Shibpur
Project Co-ordinator, DST-STUTI Project: Prof. Sagar Pal Email: sagarpal@iitism.ac.in	Program Co-ordinator: Prof. Shailendra Sharma Email: sksharma@iitism.ac.in	Program Co-ordinator: Dr. Syed Minhaz Hossain Email: hod@physics.iests.ac.in
Project Co-Coordinator, DST-STUTI Project: Prof. Ravi K. Gangwar Email: ravi@iitism.ac.in	Program Co-Coordinator: Prof. R. Thangavel Email: rthangavel@iitism.ac.in	Program Co-coordinator: Dr. Mojammel Haque Mondal Email: mojammelh.mondal@physics.iests.ac.in



#### Eligibility Criteria for participants:

- A person of Indian origin;
- Minimum qualification should be (Post Graduate) or B.Tech. (Technology);
- Professors/Scientists/Post-Doc Fellows/Ph.D. Fellows/Industry persons who are actively involved in research and development (R&D);
- Not more than 3 people from one institute should be allowed from outside the host institute.

Last date of filling in application form is on 08.12.2022 using the link

[https://docs.google.com/forms/d/e/1FAIpQLSeAINH3e8s8cfIT-boQdTPFKEP3juyIGdqiQYZOr3fM681xwA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSeAINH3e8s8cfIT-boQdTPFKEP3juyIGdqiQYZOr3fM681xwA/viewform?usp=sf_link)

