Centre of Excellence in Renewable Energy (CERE) IIT(ISM), Dhanbad

Objectives

Training: To trend highly qualified and innovative personnel by specialized training and knowledge in the field of solar and wind energy
- ✓ Through academic project (UG, PG students) & Ph.D. Prog.
  - ○ Graduate & Master Students (Science & Engineering both)
- ✓ Short Term Course/Refresher Course
  - ○ Executives & Diploma Holders

Research

Area Identified: Solar PV, Wind Energy, Bio-mass Conversion

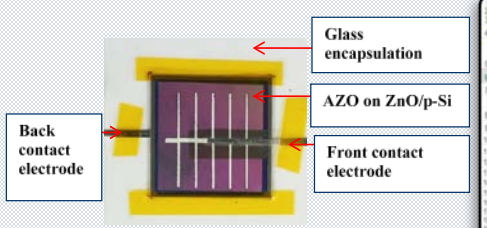
Direct social impact

- Development of fully solar energy driven **pumping system** for irrigation in a village nearby IIT(ISM),DHN.
- Awareness camp at school level, Hands on training on solar panel installation for school leaving students.

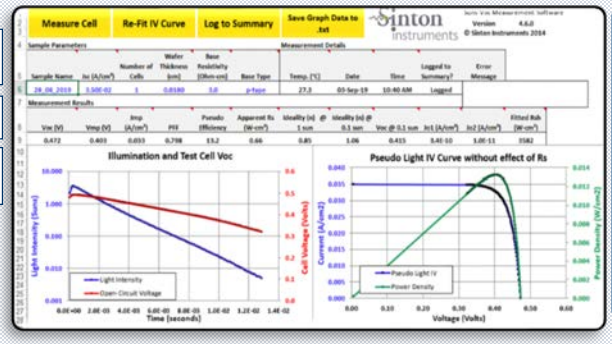
Establishment

- Creation of Facilities for Research & Training in Renewable Energy

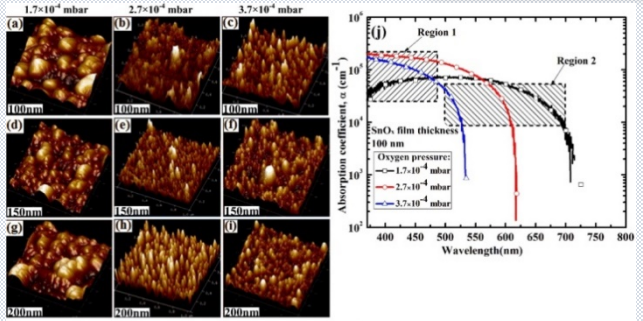
Two days "Training cum Awareness Program on Renewable Energy" for School Students under the program, ' Rashtriya Avishkar Abhiyan' (RAA) of MHRD, GoI, was successfully conducted during 27th -28th Feb, 2016 & 14th - 15th Sept., 2018.

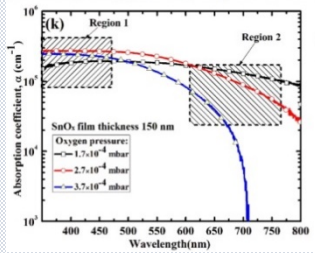


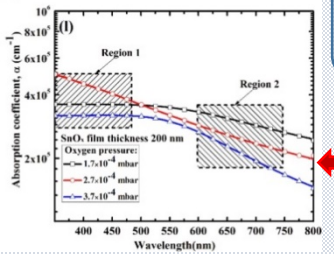
AZO/ZnO/Si heterojunction Solar cell developed in the lab



- ❑ **Successfully achieved V_{OC}~472mV (81% improvement)**
  - Undoped ZnO/Si heterojunction solar cell Highest reported V_{OC}~260mV, (*Prog. Photovolt. Res. Appl. 2017; 1–9)*







- ❑ **Successfully developed p-type SnO_X thin film**
  - Controlled oxygen pressure by using e-beam evaporation
    - ✓ Improved carrier concentration ~of ~7×10^{18} /cc
    - ✓ Improved mobility 9 cm^2/Vs
- ❑ **Successfully achieved Good crystal quality and absorption coefficient**
  - Optimised O_2 pressure and thickness of SnO_X thin film
    - ✓ Good crystal quality and absorption coefficient

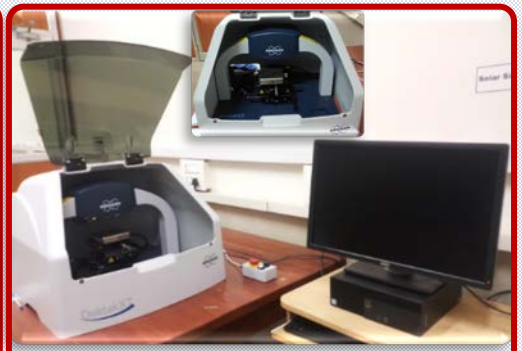
AFM 3D micrographs of SnO_X film for different thicknesses grown at different O_2 pressures.

Important Equipment/Facilities at (CERE), IIT(ISM), Dhanbad

Semiconductor Parameter Analyzer (with *I-V*, *C-V*, *C-F*)
Make: KEYSIGHT B1500A

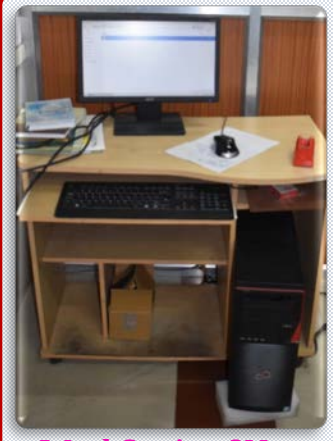
Hot plate with magnetic stirrer (temp up to 350°C)
Make: REMI

Solar Simulator & SMU
Make: NCPRE, IIT Mumbai & Keithley



STYLUS Based Thickness profiler
(Make: BRUKER DektakXT)

Grid Connected Solar Converter (Multilevel) System
Make: Hertz Power Control



WorkStation-2Nos.
(20 core Processor
RAM-196GB
Make: FUJITSU

Fume Hood
Make: LabGuard

Customized Dual Chamber PVD System for Thin Film Deposition
[RF/DC Sputtering (3 confocal magnetron), Thermal, and E-beam Evaporation]
Make: HHV Pvt. Co. Ltd.

Hall Effects Measurement System
(Assembled)
Magnetic field up to 1.5 Tesla

Muffle Cum Tube Furnace
(Rising rate up to 15°C/min,
Temp: up-to 1200˚C
Under controlled gaseous environment)
(Make: Ants Innovations (P) Ltd)

Rapid Thermal Processor
(Rising rate (max) 80°C/sec.,
Temp: up-to 1200 ˚C
Under controlled gaseous environment)
(Make: Ecopia RTP 1300)

Grid connected Wind emulator with Doubly Fed Induction Generator
Make: Entuple Technology Pvt. Ltd.