

## Centre of Excellence in Macroelectronics Certification by Hind High Vacuum



### Group-I: Monte Carlo Simulation and Techniques for Scientific and Engineering Problems

1. Performing higher dimensional integrals
2. Simulating the growth of thin films and simulation of spin systems
3. Simulated annealing for optimization/decision making
4. Randomized algorithms for the nucleation and growth of pores in NPG
5. Study of Anderson localization in a disordered model of electrons

### Group-II: Thin film sensors & memory applications

1. Preparation and Characterization of Chalcogenide Materials for Phase Change Memory applications
2. Design and Implementation of Electronic Biosensor for Hormone Analysis Study of Anderson localization in a disordered model of electrons

### Group-III: Hydrogen Gas sensor & System

1. Development of IoT enabled measurement system & manufacturing process sequence for hydrogen sensing system
2. Development of Suppliers List and Bill of materials for manufacturing a hydrogen sensing system, its components and sub systems
3. Identification of target customers, marketing strategy and competitor analysis of hydrogen sensing systems
4. Cash flow and economic analysis of manufacturing hydrogen sensing systems
5. Product Design of hydrogen sensing system using software tools

### Group-IV: Modelling of current MOS technology & futuristic nanoelectronics devices

1. Quantum Wells, Wires and Dots simulation and analysis for emerging quantum computing
2. High-mobility field-effect transistors (HEMT) simulation and analysis for RF & High frequency 5G Circuits
3. Stanford 2D Semiconductor Quasi-Ballistic Transistor Compact Model for modern sub-10 nm MOSFET
4. Carbon Nanotube (CNT) and Carbon Nanowire FET for next generation processors
5. TCAD simulation of thin film transistor for flexible electronics display & circuits

### Group-V: Modeling of Pressure Sensors

1. Study and modelling of pressure sensors using electromechanical properties for piezosensing applications
2. Study and modelling of pressure sensor structure for energy harvesting applications

### Group-VI:

1. Bioactive thin films for food packaging
2. Design and optimization of a-Si/C-Si Heterojunction Solar cell using AFORS- HET Software

### Group-VII:

1. Vital parameter measurement of human subjects & analysis using myRIO
2. Design & Implementation Smart house control using Lab view
3. Machine Learning & Data analytics techniques for sensing devices
4. Design of Interfacing for sensors and Embedded systems

### Group-VIII: Metal chalcogenide & graphene thin film for emerging applications

1. Study on recent advances in antiviral nanomaterials
2. Study on recent advances in metal chalcogenide nanostructures for energy and environmental applications.
3. Study on recent advances in inorganic nanostructures for biomedical applications.
5. Study on recent advances in graphene and its composites for energy, biomedical and environmental applications.
6. Study on recent advances in synthesis and applications of highly transparent and conducting Indium thin oxide (ITO) nano structures

### Group-IX:

1. Validation of mechanical properties of thin films
2. Validation of process parameters of Electrospun nanofibers.
3. Simulation of ZnO nanotubes for gas sensor Applications

#### For Information Contact:

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