MANGALORE UNIVERSITY

Global Initiative on Academic Network (GIAN) program on

Nanostructure based wideband gap materials for sensor applications

(October 11-17, 2018)

Overview

Nanotechnology is an advanced technology to create and use materials, develop devices and systems with fundamentally new properties and functions because of their ability to assemble in a unique fashion at the atomic and molecular scale. with a promise to offer new functionalities contributing to economic prosperity and sustainable development. There has been intense activity in this area demonstrating considerable success in preparing nanoparticles, nano wires and nanostructures in good quantities with a reasonable control on the dimensions. This course is structured at an advanced level to teach students hands-on skills to use the most current nanostructure fabrication methods, analysis techniques and integration with the electronics.

Objectives

- Learn the basics of nanostructure materials for sensor applications
- Understand the difference between physical, chemical and epitaxy based fabrication methods
- Analyze nanostructures for structural, optical and sensor properties using the advanced charaterization methods
- Learn the sensor integration methods

This course is divided into five main sections:

1) to introduce advanced processing methods for synthesizing nanomaterials, ranging from single nanoparticles to three-dimensional nanostructures
2) to discuss important structural, optical, thermodynamic and sensing concepts related to materials and composites
3) to describe methods for characterizing the structure and properties of nanomaterials
4) to discuss current and emerging applications for nanomaterials,
5) architecture of sensors and integration with commercial off the shelt read-out platforms

Who can attend?

- Faculty Members / Research Scholars / Students (B Tech / M Sc / M Tech / PhD)

Course Duration: October 11-17, 2018

Course Schedule

Date	Lectures / Tutorials
October 11, 2018 10:00 – 10: 30 hrs	Inaugural Program
11:00 – 12:00 hrs	Introduce advanced processing methods for synthesizing nanomaterials, ranging from single nanoparticles to three-dimensional nanostructures
12:00 – 13:00 hrs	Discuss important structural, optical, thermodynamic and other important concepts related to materials and composites characterisation
14:30 – 16:30 hrs (Tutorial)	Analyze structural properties of materials. Learn how to identify crystal structure, index planes and calculate lattice parameter
October 12, 2018 10:00 – 11: 00 hrs	Modification and tuning of optical properties in nanostructures
11:00 – 12:00 hrs	Describe methods for characterizing the structure and properties of nanomaterials
12:00 – 13:00 hrs	Radiation processing of properties of nanostructures and bulk materials
October 13, 2018 10:00 – 11: 00 hrs	Discuss current and emerging applications for nanomaterials
11:00 – 12:00 hrs	Study of quantum size effect and its importance in understanding nanomaterials
14:00 – 16:00 hrs (Tutorial)	Examine optical properties of nanostructures using spectroscopic methods
October 14, 2018 SUNDAY	
October 15, 2018 10:00 – 11: 00 hrs	Understand physical, chemical and direct vapour phase methods to develop nanostructures
11:00 – 12:00 hrs	Thermodynamic considerations in selecting fabrication methods of nanostructures
12:00 – 13:00 hrs	Direct vapour phase method – experimental set up
October 16, 2018 10:00 – 11: 00 hrs	Device fabrication considerations using photolithography methods
11:00 – 12:00 hrs	Electric output considerations for integrating sensors & Demonstrate sensor operation
October 17, 2018 10:00 – 11: 00 hrs 11:30 hrs	TEST Valedictory Program

Foreign Faculty:

Dr Shiva Hullavarad
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University of Alaska
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Dr Shiva Hullavarad received Ph.D. degree in Applied Physics and MBA in Technology Management. He is affiliated faculty at Advanced Materials Group at the University of Alaska Fairbanks. He has been developing the ultra violet sensors in the deep UV region (<250 nm) and nitride MEMS/NEMS high for the defense and space industry. Dr.Hullavarad spent his post-doctoral at University of Pretoria, South Africa and Kwangju Institute of Science Technology, South Korea where he developed the thresholds for GaN, AlGaN device failure under radiation environment. He then continued his post-doctoral research at University of Maryland in alliance with Maryland Economic Development Corporation to identify technologies for commercial development. Dr. Hullavarad was invited by University of Alaska to build the state of Alaska's first nanotechnology program funded by US – Defense Advanced Research Project Agency. His recent work on Gains in Green Innovation for Competitive Advantage has gained interest in academia and industry. He has authored 85 research articles in international journals, 3 patents and book chapters in the areas of wide bandgap semiconductors

Course Co-ordinator

Dr Ganesh Sanjeev
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Dr Ganesh Sanjeev has been working on Radiation processing of materials and devices, Radiation effects on nanoparticles, nanostructure devices and nano composites, Synthesis and Radiation effects on quantum dots, Photon & Neutron Activation Analyses, Photofission studies, Radiation Dosimetry, Biophysics and Microtron based research studies. He has authored 235 research articles in refereed

national / international journals and presented / published 220 research papers in International / National Conferences / symposia.
(https://mangaloreuniversity.ac.in/sites/default/files/Physics/GANESH_Sanjeev_Physics_2018.pdf)

Course Fee:

Scientists and Faculty Members	Rs.2000
Guest faculties / Research Scholars	Rs.1000
Students	Rs.500
International participants	US $100

Note: **The participants will be provided with accommodation (on request in advance) on payment basis.**

Please contact the Course Co-ordinator for all the queries pertaining to the GIAN course.

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