

Institute of Nano Electronic Engineering (INEE)

Introduction

Institute of Nano Electronic Engineering (INEE) has been established as a converging hub for innovation, research and expertise in Malaysia, particularly for the Northern Corridor Economic Region (NCER). The objectives of the Institute are to promote nano electronics within the Malaysian market, introducing the best in micro and nano fabrication practices from around the world to Malaysian society and building direct links between technology and education sectors. INEE emphasizes on nano electronics engineering research activities that focus on nano biochip, novel devices, memory devices and nano photonic devices. INEE will expand its research activities to nano materials and nano biotechnology through interdisciplinary programs and collaborations. As a nano electronic research center, INEE's role is to encourage and embrace collaborative work and interdisciplinary research among scientists and technologists. INEE strives to be a leading nano electronic research center in the region in line with Malaysia's goal of having world class scientists.

INEE accommodates a series of fabrication and analytical laboratories equipped with sophisticated scientific equipment to enable design, fabrication, characterization and testing of devices. INEE is designed to accommodate state-of-the-art facilities and capabilities to enable device design, coherent with cutting edge technologies, for researchers to utilise and materialise into comprehensive research. Innovative efforts, coupling fundamental and applied sciences with technological advances in the field of nanofabrication should lead to ever more powerful devices that will accelerate the realization of the high performance devices with speed, simplicity and low cost for the 21st Century needs. Recognising the importance of the above, INEE aspires to create awareness to Malaysian research communities, specifically in nano electronic research areas and it is hoped to be able to strengthen national economic capabilities as well as to the well being of the nation.

Mission

INEE's mission is to serve as an landmark of excellence and function as a reference institute in nano electronic engineering capable of enhancing performance beyond conventional devices which are based on the current industry standard.

Vision

INEE envisions is to emerge as a frontier research institute across the spectra of nano electronic engineering from the life and physical sciences to engineering and medicine.

Theme

'From Nano structure to Systems' reflects the overall mission and vision of INEE.

Objectives

In order to achieve its mission and vision, the following objectives will be adhered to:

i. To be a reference institution and expertise provider in nano electronic engineering.

ii. To accommodate a series of fabrication and analytical laboratories equipped with sophisticated scientific equipment enabling specialised device design, fabrication, and characterization.

iii. To enhance, modernise and encourage new exploration in nano electronic engineering through fundamental and applied research activities for society and country benefit.

iv. To facilitate training programmes and post graduate studies in nano electronic engineering.

v. To consult and extend collaboration with related global institutions engaged in research of nano electronic engineering.

Research Focus Areas

Initially, INEE will focus its research in the following areas:

i. Nano Biochip Research

- Nano Structure Based Biosensor
- Nano Material Based Biosensor
- CMOS Based Biosensor
- Cantilever Based Biosensor

ii. Novel Silicon Devices Research

- Single Electron Transistor
- Vertical Transistor
- Nano CMOS
- Silicon Based Molecular Electronic

iii. Memory Devices Research

- Non-volatile Memory Device
- Volatile Memory Device
- Nano Photonics Research
 - Nano Photonics Devices
 - Nano Fluidisc Devices
 - Quantum Optical Devices

The development Biosensors for - DNA, Protein, CNT-Based and CMOS-Based are the leading and the most active research in INEE for applications of agriculture, medicine, food and environment

Research Staff

INEE comprises a number of experts with expertise in various factions of nano-electronics technology and engineering. As a newly established institute, the number of technical staff is about 10.

INEE research staff provide a broad range of expertise which includes theoretical and experimental efforts and allow INEE to address problems at levels ranging from basic materials to complex systems. The areas of expertise include mask design, simulation and modelling, device fabrication, device characterization and testing.

Research Facilities

INEE comprises of 4 laboratories with state-of-the-art scientific equipment and facilities to accommodate researchers involved in device design, fabrication, characterization and testing. In principle, these laboratories are on a sharing basis with the School of Microelectronic Engineering.

Micro Fabrication Cleanroom Laboratory

This laboratory consists of eighteen (18) major equipment for Micro Fabrication research purposes.

Nano Fabrication Cleanroom Laboratory

This Laboratory is equipped with six (6) major equipment for Nano Fabrication research purposes.

Failure Analysis Laboratory

This laboratory consists of twelve (12) equipment for Failure Analysis research purposes.

Nano Biochip Laboratory

This laboratory consists of ten (10) equipment related to Nano Biochip research purposes.

Currently there are 12 ongoing projects, funded by various agencies. These projects enable the institute and its members to be very active, especially in receiving awards, of which there are 6, from 10 different grants that total to RM1,539,100.00. Publication of research work is also a very active activity with a total of 35 published papers in journals and conferences.

Teaching, Research, Services, Consultations and Supports

Besides doing research in nano electronic engineering, INEE also offers its services and support as follows:

- Research supervision through postgraduate studies
 - MSc (Nanoelectronics Engineering)
 - PhD
- Mask design and fabrication services:
 - High resolution transparency
 - Chrome mask (Material: Soda-lime glass (SL), Synthetic quartz (QZ))
- Training, workshop and short-course in:
 - Cleanroom design and technology
 - Semiconductor process technology
 - Microelectronic fabrication
 - Nano structure formation
- Process fabrication and device characterization services:
 - MOSFET based technology fabrication
 - Nano structure patterning (E-beam Lithography)
 - Electrical analyses (Dielectric Analyzer)
- Micro and Nanoelectronic Education Development:
 - Syllabus and curriculum development
 - Laboratory manual in microfabrication
 - Cleanroom design and development for education

Contact

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