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Overview
Institute of Microengineering and Nanoelectronics
Background of IMEN

The Department of Electrical, Electronics and Systems Engineering of UKM started microelectronics research activities in 1988. The activities were on small-scale and focused on IC design, simple device (such as Schottky diode) fabrication and theory modeling. Prof. Syono from Sophia University, Tokyo played a major role in the construction and development of the first microelectronics laboratory/cleanroom. He gave many ideas for the layout of cleanroom and even donated a few equipment to jumpstart UKM's initial research in microelectronics. The first oxide layer was successfully grown in this cleanroom in 1992 using the small furnace contributed by Prof. Syono. Research on organic electronics first started at the UKM Physics Department in 1987.

In 1993, Telekom Malaysia R&D Sdn. Bhd. (TMR&D) recognized the cleanroom and presented UKM a RM 1 million grant to upgrade the cleanroom into microelectronics research centre called UKM-TM Microfabrication Laboratory. All activities were centered on fabrication using silicon technology. The lab also contributed to TMR&D research outputs. UKM-TM Microfabrication Laboratory was expanded in December 1997 to accommodate a 1000 class cleanroom for III-V compound and microwave monolithic integrated circuits devices research. The upgraded lab with additional grant given was named UKM-TM Microelectronics Research Centre (MERC) under the UKM Faculty of Engineering and TMR&D Sdn. Bhd. At the time, MERC was the only research centre in Malaysia that accommodated semiconductor fabrication facilities for research studies.

The proposal to build a centre of excellence for strategic research on MEMS was first introduced in 2002 by the IRPA fund panel of Ministry of Science, Technology and Innovation (MOSTI) when MERC was given IRPA fund worth RM 38 million to conduct research on developing MEMS technology for automotive applications. The centre of excellence for MEMS research would serve as the nation’s resource of MEMS research in Malaysia and aims at putting Malaysia on the map in the research area. The director of MERC, Prof. Dr. Burhanuddin Yeop Majlis proposed to combine MEMS research team with MERC, Organic Electronics, VLSI technology, and Photonics Technology groups to solidify the multi-disciplinary centre of excellence.

The Ministry of Education Malaysia gave the approval to build Institute of Microengineering and Nanoelectronics (IMEN) in November 2002 as an institute of Universiti Kebangsaan Malaysia. IMEN would conduct research on MEMS technology primarily the IRPA project given, together with five other research themes which are organic electronics, micro and nanoelectronic systems, MBE technology for high frequency devices (collaboration with TMR&D) and photonics technology. The microelectronics devices packaging research group joined IMEN in 2007.
Vision of IMEN

To be a world class research institute in microengineering and nanoelectronics.

Mission of IMEN

To develop and excel in research in advanced micro and nanoelectronics, MEMS and microsensor technology, organic electronics, photonics and VLSI technology so as to contribute to technological advancement of Malaysia. IMEN is the country’s leading centre of excellence for postgraduate studies and research on microengineering and nanoelectronics specifically in the following research themes.

- MEMS/NEMS
- Photonics & Nanophotonics
- Organic and Printed Electronics
- Microelectronics Packaging
- Micro and Nanoelectronic Systems
- Nanoelectronics

Each theme comes with a set of scientific and technological challenges such as modeling and design, materials science, device engineering, characterization and packaging, and may be multidisciplinary.

The mission is realized through Masters of Science and PhD programs, well-equipped facilities and a continuous quest to innovate designs, devices, processes, circuits and systems which could involve multiple disciplines. IMEN aims to foster microengineering and nanoelectronics technologies advancement in Malaysia through providing intellectual resource and human capital equipped with relevant knowledge in this field.

Objectives of IMEN

- To strengthen and enrich knowledge in micro and nanoelectronics, micro-electromechanical systems/nano-electromechanical systems (MEMS & NEMS), advanced devices, MEMS & nanotechnology systems, organic & printed electronics, advanced packaging technology, and photonics & nanophotonics through research and development activities.
- To develop capacity building in micro and nanoelectronics, micro-electromechanical systems/nano-electromechanical systems (MEMS/NEMS), advanced devices, MEMS & nanotechnology systems, organic & printed electronics, advanced packaging technology, and photonics & nanophotonics.
- To create local human resource in micro and nanoelectronics, micro-electromechanical systems/nano-electromechanical systems (MEMS/NEMS), advanced devices, MEMS & nanotechnology systems, organic & printed electronics, advanced packaging technology, and photonics & nanophotonics.
- To promote public awareness of the contributions of microelectronics in developing the nation by organizing public lectures, seminars and outreach programs, and publications.
- To strengthen national and international networks thus putting Malaysia in global perspective.
Foreword from The Director
Institute of Microengineering and Nanoelectronics
Universiti Kebangsaan Malaysia

It is my great pleasure to present IMEN Annual Report 2011 highlighting the year’s progress and activities of the institute. In approaching IMEN’s 10 years birthday, I am happy to note that the institute has progressed leaps and bounds since since its establishment in November 2002.

I am proud to announce that IMEN is chosen as one of the country’s nanotechnology centre of excellence. The award was presented by the Minister of Science, Technology and Innovation, YBhg. Dato’ Dr. Maximus Ongkili on 15 July 2011 at the NanoMalaysia Summit and Expo 2011 held at the Putra World Trade Centre (PWTC). Out of 17 applications, the other four selected Nano Malaysia CoE are the Institute of Nanoengineering UniMAP, the Ibnu Sina Institute UTM, MIMOS Berhad and the Centre of Innovative Nanostructures & Nanodevices (COINN) UTP. We are humbly honored to be recognized for our contribution and continuous efforts in R&D on nanotechnology notably in MEMS and sensors and are further motivated to maintain our role as major player in science and education.

IMEN was delighted to receive a special visit from the President of Motorola Technology for Malaysia, Mr. Mohd Rauf Nasir and the Chief of Staff
of the Penang Design Centre of Motorola Solutions, Dr Mohd Nor Azmi Alias in August 2011. They were here to learn about our research and to explore the possibility of collaborative work. It would be interesting to have scientific collaborative works with Motorola in which students could gain valuable technology knowledge from them.

For the first time, we also organized the International Workshop on ‘Nanotechnology in the Edge of Convergence’ together with COMSATS Pakistan and the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), India. The workshop was held at Puri Pujangga UKM on 24-27 November 2011. We were delighted to host the event and met participants from 19 developing countries such as Algeria, Bangladesh, Bulgaria, Cambodia, Mesir, India, Pakistan, Sudan, Indonesia, Iraq, Kenya, Malawi, Mauritius, Myanmar, Nepal, Tunisia, Uganda and Vietnam. I would also like to thank the UKM Deputy Vice Chancellor in Academic and International Affairs YBhg. Prof. Datuk Dr. Noor Azlan Ghazali for officiating the event and Prof. Dr. Halimaton Hamdan, Director of National Nanotechnology Directorate, Ministry of Science, Technology and Innovation (MOSTI) for delivering the first keynote paper. Through the workshop, participants shared their country’s nanotechnology research activities, exchange expertise and technical know-how and discuss current advancements in nanotechnology. Prof. Dr. Arun P. Kulshreshtha, Director, NAM S&T Centre India and Dr. Arshad Saleem Bhatti, COMSATS Institute of Information Technology (CIIT) Pakistan also attended the workshop.

Following our MoU with Inter-University Semiconductor Research Centre, Korea and Indonesian Institute of Sciences in 2007 respectively, we continued the annual Korea-Malaysia Joint Workshop on Nanotechnology and the IMEN-LIPI Joint Seminar activities. IMEN fellows presented their research works in the workshop held in October 2011 at the Seoul National University. The workshop was attended by over 80 students from the university. The highlight of the trip was the visit to Samsung Electronics manufacturing facilities. We were excited to be given the opportunity to tour around the facilities of a giant name in semiconductor electronics industry, courtesy of Prof. Dr. Jong Duk Lee who is one of the company’s advisor and consultant. The IMEN-LIPI Joint Seminar on Microelectronic Devices, Systems and Instrumentations was held in November in Jogjakarta Indonesia. The seminar further strengthens our friendship and we had a wonderful time sharing knowledge with our friends from LIPI.

IMEN will continue its quest to produce results that harness the benefits of enabling technologies and graduates who have technical know-how that contributes to mankind. We must be ambitious now that we are recognized as a NanoMalaysia centre of excellence. Lastly, I wish to thank all IMEN research fellows, staff and postgraduate students for their effort and to UKM for support given to make IMEN the preferred resource centre for research and postgraduate studies in microengineering and nanoelectronics in Malaysia.

PROF. DATO’ DR. BURHANUDDIN YEOP MAJLIS
Organization
Institute of Microengineering and Nanoelectronics
Academic Staff
1. Prof. Dato’ Dr. Burhanuddin Yeop Majlis, Director & Theme Leader MEMS & NEMS Technology
2. Assoc. Prof Dr. Azman Jalar@Jalil, Deputy Director & Theme Leader Microelectronic Packaging & Materials
3. Prof. Dr. Muhamad Mat Salleh, Theme Leader Organic & Printed Electronics
4. Prof. Dr. Shahbudin Shaari, Theme Leader Photonics & Nanophotonics
5. Prof. Dr. Masuri Othman, Theme Leader Micro & Nanoelectronics System Design
6. Prof. Emeritus Dato’ Dr. Muhammad Yahaya, Principal Fellow
7. Prof. Dr. Pankaj K. Choudhury, Principal Fellow
8. Prof. Dr. Ilse C. Gebeshuber, Principal Fellow
9. Dr. Dee Chang Fu, Research Fellow
10. Dr. Azrul Azlan Hamzah, Research Fellow
11. Dr. Md. Shabiul Islam, Research Fellow
12. Dr. Akrajas Ali Umar, Research Fellow
13. Dr. Jumril Yunas, Research Fellow
14. Dr. Badariah Bais, Research Fellow
15. Dr. P. Susthitha Menon, Research Fellow
16. Abang Annuar Ehsan, Research Fellow
17. Abdul Rahman Mohmad, Junior Fellow
18. Chin Shin Liang, Junior Fellow
19. Dilla Duryha Berhanuddin, Junior Fellow
RESEARCH STAFF

1. Prof. Dato’ Dr. Burhanuddin Yeop Majlis, – Director
2. Mohamed Razman bin Yahya, (BSc., MSc.) – Research Officer TM R&D
3. Asban Dollah, BSc. (UM) – Research Officer TM R&D
4. Nurul Afzan Omar, – Research Officer TM R&D
5. Samsiah Ahmad, BSc. (UKM) – Research Officer TM R&D
6. Idris Sabtu, BSc. MSc. (UKM) – Research Officer TM R&D
7. Mimiwaty Mohd Noor, BSc. MSc. (UKM) – Research Officer
8. Mohd Faizal Aziz, BSc. (UKM) – Science Officer
9. Hayati Husin, BSc. MSc. (UKM) – Science Officer
10. Khairul Nisha bt. Dato’ Mohd Kharuddin, BSc. MSc. (UKM) – Science Officer
11. Tengku Hasan bin Tengku Abdul Aziz, BSc. MSc. (UKM) – Science Officer
12. Shafii bin Abd.Wahab, BSc (UPM) – Science Officer
13. Mohd. Hannas Hosnon, BEng (Totori) – Engineer
14. Aisyah bin Fauthan, BEng (Uniten) – Technician
15. Mohd. Azrin bin Omar, – Technician

ADMIN Staff
17. Muhammad Aizuddin Saharudin, BBA (Uniten) – Assistant Registrar
18. Jumaah binti Abdul Aziz, – Secretary
19. Mohd. Fahmi bin Mohamad Mustafa, – Admin. Assistant
20. Faeizah Buang, Admin, – Assistant
21. Hazde Akmar bin Mohd Salleh, – General Office Assistant
Profile of Principal Fellows
Institute of Microengineering and Nanoelectronics
1. **Prof. Dato` Dr. Burhanuddin Yeop Majlis**, D.P.M.P BSc. (UKM), MSc. (Wales), PhD. (Durham), J.M.N., SMIEEE, FMASS
   - MEMS/ NEMS technology
   - Microelectronics and microfabrication
   - MEMS microstructure and sensing devices,
   - RF MEMS and BIOMEMS
   - Lab-on Chip
   - MBE technology

2. **Prof. Dr. Muhamad Mat Salleh BSc. (ITB),**
   Drs (ITB), PhD. (London), MIEEE, FMSSS
   - Preparation and characterization of thin films for electronics
     devices, odor and gas sensors
   - Organic light emitting diodes (OLED)
   - Electrochromic windows
   - Solar cells
   - Langmuir-Blodgett films

3. **Prof. Dr. Sahbudin Hj. Shaari**
   BSc. (UKM), MSc. (Essex), PhD. (Wales), MIEEE, MMSSS Nano photonics
   - Quantum electronics and lasers
   - Fibre optics and waveguides
   - Optical communications
   - Optical systems
   - Microelectronic devices
   - Optoelectronic devices

4. **Prof. Dr. Masuri Ohman BSc. (UKM),**
   MSc. (Essex), PhD. (Southampton), MIEEE
   - Design and implementation of integrated circuits for telecommunications
   - On-chip implementation of DSP algorithms
   - Development of smart microchips for MEMS interfacing
   - Application of VLSI in automotive

5. **Prof. Emeritus Dato’ Dr. Muhammad Yahaya**
   BSc. (ITB), Drs (ITB), PhD. (Monash), MIEEE, FMSSS
   - Solid state physics energy, thin films and sensor technology
   - Nanomaterials
   - Solar cells
   - Energy

6. **Assoc. Prof. Dr. Azman Jalar**
   BSc. (UKM), PhD. (Birmingham), MIEEE
   - Microstructure-properties-performance-relationship of materials
   - Nanomaterials

7. **Prof. Dr. Ilse C. Gebeshube Privatdozentin**
   (Dr. habil.) PhD Dipl.-Ing., Vienna University of Technology, Institut fuer Allgemeine Physik, Austria
   - Biomimetics
   - Ion-surface-interaction: Sputtering, nanostructure formation, capillary guiding, etc
   - Fusion plasmas: fusion plasma diagnostics, plasmawall-interaction, ECR ion source development
   - Ultrafast lasers in physics: laser-matter-interaction, laser ablation, medical applications, two-photon-modification
   - Applications of ultra-short lasers in material science nanotechnology and nanotribology
   - Biophysics AFM-imaging of bacteria, blood and cancer- cells
   - Scanning probe microscopy

8. **Prof. Dr. Pankaj K. Choudhury**
   BSc. (India); M.Sc. (India); Ph.D. (India); SMIEEE, MOSA
   - Optical waveguides of different cross- sectional geometries and/or materials
   - Complex mediums
   - Thin film optical waveguides fabrication and characterization
   - Optical sensors
   - Photonic crystals
   - Vertical cavity surface emitting lasers

9. **Dr. Dee Chang Fu**
   BSc. (Malaya), MSc. (Malaya), PhD. (UKM)
   - Nanowires and CNT
   - GaAs technology

10. **Dr. Akrajas Ali Umar**
    BSc. (UNRI), PhD. (UKM)
    - Semiconductor nanocrystals
    - Metallic nanoparticles
    - Nanocrystal-organic hybrid synthesis for optoelectronic devices
11. **Dr. Jumril Yunas**  
Dipl.-Ing (Univ. of Technology Aachen, Germany), PhD. (UKM)  
- Micro and Nano Electro Mechanical Systems (MEMS/NEMS) devices and technology  
- Micro-sensors, lab-on chip  
- RF (radio frequency) devices and power electronics devices  
- Optoelectronics devices

12. **Dr. Md. Shabiul Islam**  
B.Sc. (RU), M.Sc. (RU), M.Sc. (UKM), PhD. (MMU)  
- VLSI design  
- Microelectronics  
- DSP hardware Implementation on FPGA using VHDL/DFL  
- FPGA realization based on  
- Fuzzy Logic (FL) algorithm  
- Embedded system design and interfacing using Micro controller  
- Microprocessor/ micro controller system and interfacing

13. **Dr. Badariah Bais**  
B.Sc., M.Sc. (Worcester Poly. Inst.), PhD (UKM), MIEEE, MSPIE  
- Microelectronics  
- MEMS/ NEMS  
- Device fabrication  
- Process simulation

14. **Dr. Azrul Azlan Hamzah**  
BSc. (California), PhD. (UKM)  
- MEMS/NEMS and packaging  
- Microfabrication

15. **Dr. P Susthitha Menon**  
BEngg., MSc., PhD. (UKM), MIEEE, MOSA, MSPIE  
- Nanophotonics  
- Optoelectronics  
- III-V materials  
- Optical communications
BURHANUDDIN Yeop Majlis is a professor of microelectronics at the faculty of Engineering. He received his Ph.D. in microelectronics from University of Durham, United Kingdom in 1988, MSc in microelectronics from University of Wales, UK in 1980 and BSc(Hons.) in Physics from UKM in 1979. He was a Deputy Dean of Engineering faculty from 1995 until 1997. He is also a Research Fellow of Telekom Malaysia Research and Development division, and he was the director of UKM-TM Microelectronics Research Centre at the Faculty of Engineering, UKM. He was responsible in developing and planning the setting up of the clean room for research at UKM. He had attended intensive industrial training in GaAs MMIC design and manufacture at GECMarconi Material Technology Ltd. United Kingdom. He is a senior member of the Institution of Electrical and Electronics Engineer (IEEE) and the Chairman of IEEE Electron Devices Malaysia Chapter from 1994 to 2006. He is also fellow of Malaysian Solid State Science and Technology (FMSSS). He is the founder chairman of Malaysia Nanotechnology Association which is established in 2007. He initiated research in microfabrication and microsensors at UKM in 1995 and has also initiated research in GaAs technology with Telekom Malaysia. In 2001 he started research in MEMS with substantial research funding of US$10 million from Ministry of Science, Technology and Innovation. His current interests are design and fabrication of MEMS sensor, RFMEMS, BioMEMS and microenergy. He has published four text books in electronics and one book on integrated Circuits Fabrication Technology for undergraduate courses and more than 400 academic research papers. Currently he is the founder director of Institute of Microengineering and Nanoelectronics (IMEN).

Qualifications:
- BSc.(Hons) in Physics from Universiti Kebangsaan Malaysia (1979)
- MSc. in Microelectronics from University of Wales, UK (1980)
- PhD in Microelectronics from University of Durham, UK (1988)

Research Interests:
- MEMS sensors and actuators
- BioMEMS/ RF MEMS
- Energy harvesting micro/ nanodevices
- MBE technology and III-V compound device fabrication and development
MEMS is a system that integrates mechanical, sensor, actuator and electronic elements on one silicon chip through microfabrication technologies. The field of MEMS encompasses devices created with micromachining technologies originally developed to produce integrated circuits, as well as non-silicon based devices created by the same micromachining or other techniques. They can be classified as sensors, actuators and passive structures.

Sensors and actuators are transducers that convert one physical quantity to another, such as electromagnetic, mechanical, chemical, biological, optical or thermal phenomena. MEMS sensors commonly measure pressure, force, linear acceleration, rate of angular motion, torque, and flow. The sensing or actuation conversion can use a variety of methods. MEMS actuators provide the ability to manipulate physical parameters at the microscale, and can employ electrostatic, thermal, magnetic, piezoelectric, piezoresistive, and shape memory transformation methods. Passive MEMS structures such as micronozzles are used in atomizers, medical inhalers, fluid spray systems, fuel injection, and ink jet printers.

MEMS group at IMEN develops miniature sensor and actuator systems using microfabrication. IMEN also conducts research in MEMS wafer level packaging, RF MEMS, BioMEMS and biometrics extraction. Research in these areas is motivated by the potential to produce high performance, low-cost, miniature sensors and actuators for automotive, telecommunications and biomedical applications. The output of this project will be commercialized products, knowledge for academia and skilled labors in this area.

Research Projects:
- RF MEMS and RFIC
- MEMS Micro-pumps, Micro-valves and Micro-needles
- MEMS Loudspeakers and capacitive microphones
- MEMS Glucose Sensor
- MEMS Microfluidics Mixers
- Biocell Filter, Separator and Detector
- MEMS Microgenerator
- MEMS Micro-inductors, Micro-transformer and Magnetometers (Magnetic Sensor)
- Nano Lab-on-Chip
- Nanotube and Nanowires
Members of MEMS and Nanoelectronics research group:

**Prof. Dato’ Dr. Burhanuddin Yeop Majlis**  
BSc. (UKM), MSc. (Wales), PhD. (Durham), J.M.N., SMIEEE, FMASS  
**Research interests:**  
MEMS/NEMS devices  
Lab on Chip  
Contact: burhan@eng.ukm.my

**Assoc. Prof. Dr. Jumril Yunas**  
Dipl.-Ing (RWTH Aachen University, Germany), PhD. (UKM)  
**Research interests:**  
III-V compound semiconductor technology  
MEMS/NEMS devices and technology  
Micro-sensors, RF devices, power electronics devices  
Optoelectronic devices  
Contact: jumrilyunas@ukm.my

**Assoc. Prof. Dr. Dee Chang Fu**  
BSc. (UM), MSc. (UM), PhD. (UKM)  
**Research interests:**  
Nanostructures growth Si, ZnO, CuO and SnO2  
Molecular Beam Epitaxy, Compound semiconductor, GaAs, PHEMT, HEMT  
Crystal growth simulation  
Monte Carlo simulation of crystal growth  
Contact: cfdee@ukm.my, deechangfu@gmail.com

**Prof. Dr. Ille Christine Gebeshuber**  
Privatdozentin (Dr. habil.) PhD Dipl.-Ing., Vienna University of Technology, Institut fuer Allgemeine Physik, Austria  
**Research interests:**  
Biomimetics  
Scanning Probe Microscopy  
Nanomedicine  
Tribology  
Contact: ille.gebeshuber@ukm.my

**Dr. Azrul Azlan Hamzah**  
BEng. (California,USA), PhD. (UKM)  
**Research interests:**  
Microfabrication  
Microenergy and microgenerators  
Microfluidics  
BioMEMS  
Lab-on-chip  
Robotics and avionic MEMS  
MEMS Packaging  
Contact: azlanhamzah@ukm.my
HE received his PhD in Solid state Physics from University of London (1970), Drs. (1973) and B.Sc. (1972) in Physics from Institut Teknologi Bandung. He was the Head of Physic Department from 1986-1991. He has been a Visiting Professor at Tokyo Agriculture and Technology University in 1991. Visiting Researcher at Takasaki Radiation Chemistry Research Establishment from 1991-1992 and Visiting Researcher at Coventry University, UK in 1995. Current research interests include preparation and characterization of thin films for electronic devices, odor and gas sensor, organic light Emitting diodes (OLEDs), electrochromic windows, solar cells, and Langmuir-Blodgett films. He has won several gold medals and other special awards for invention of sensor devices and OLEDs.

Qualifications:
• Drs in Physics from Institut Teknologi Bandung (1973)
• Ph.D in Solid State from University of London UK (1979)

Research Interests:
• Preparation and characterization of thin films for electronics devices, odor and gas sensors
• Organic light emitting diodes (OLED )
• Electrochromic windows
• Solar cells
• Langmuir-Blodgett films
Research Theme
Organic and Printed Electronics

Members of Organic and Printed Electronics research group:

Prof. Dr. Muhamad Mat Salleh
BSc. (ITB), Drs (ITB), PhD. (London), MIEEE, FMSSS

Research interests:
Organic light emitting diodes (OLED)
Electrochromic windows
Solar cells
Langmuir-Blodgett films
Contact: mms@ukm.my

Assoc. Prof. Dr. Akrajas Ali Umar
BSc. (UNRI, Indonesia), PhD. (UKM)

Research interests:
Controlled-growth morphology, size and surface structures of metals, such as Au, Ag, Pt, Pd, Cu, Ni, Co, in order to obtain a desired physical and chemical properties, such as electrical, optical, optoelectronics and catalysis properties
Growth of semiconductors quantum dots with designed physical and chemical properties for optoelectronics and sensors applications
Quantum dots-organic hybrid for optoelectronics device
Contact: akrajas@ukm.my; akrajas@yahoo.com
Sahbudin Shaari is a Professor of Microelectronics in the Department of Electrical, Electronics and System Engineering at the Faculty of Engineering & Built Environment in Universiti Kebangsaan Malaysia (UKM) since 2002. He is also a Principal Research Fellow at the Institute of Microengineering and Nanoelectronics (IMEN), UKM and leader of the Photonics & Nanophotonics Research Group in UKM. He is also a Research Fellow at Telekom Malaysia Research and Development Division since 2007. Prof. Dr. Sahbudin graduated with a PhD degree in Microelectronics from the University of Wales in 1989. He obtained his MSc degree in the field of Quantum/Optoelectronics from the University of Essex and his BSc degree in Physics/Electronics from UKM in 1980 and 1978 respectively. He is a member of the Institution of Electrical and Electronics Engineers (IEEE), laser and Electrooptic Society (LEOS), Electron Devices Society (EDS), the International Society for Optical Engineering (SPIE), Optical Society of America (OSA) and Malaysia Solid State Science Society (MSSS). Prof Dr Sahbudin is the founder of the Photonics Technology Laboratory (PTL) in UKM and co-founder of the UKM-Telekom Micro-fabrication Laboratory. In 1997, his research group was selected to represent UKM as one of the five research group in Malaysia to be involved in the first national top-down photonics research project to undertake the project entitled “Development of an All-Optical Network System Based on WDM-FTTH Technology” to develop passive components for the proposed system. He has publications in 30 international journals and more than 100 international/national conference proceedings; all in the field of photonics. His current research interests are in nanophotonics, photonics technology and photonics communications.

Qualifications:
- BSc. in Physics from Universiti Kebangsaan Malaysia (1979)
- MSc. in Quantum Electronics from University of Essex, UK (1980)
- PhD in Microelectronics from University of Wales, UK (1989)

Research Interests:
- Nano photonics
- Quantum electronics and lasers
- Optical communications
- Microelectronic devices
- Optoelectronic devices
Research Theme

Photonics Technology and Nanophotonics

The laboratory is a research entity under the main umbrella of Microelectronics with support and cooperation from MOSTI and industries. The laboratory was selected as one of the National Photonics Research Laboratory involved in the first national top-down photonics research project called “Development of an All-Optical Network System based on WDM-FTTH Technology”. This lab’s role is to develop passive components for the proposed system with an allocation of a few RM million for the period from 2000-2003. Cooperation and linkages with the industries have further boosted our research activities to the frontiers of the subject. The research activities can be divided into a few major streams:

- Fiber optics fusion coupling technology to produce fiber-based components
- Waveguide components design technology
- Integrated components design technology
- Integrated optical receivers
- Optics; polymer technology

Members of Photonics Technology and Nanophotonics research group:

**Prof. Dr. Sahbudin Shaari**
BSc. (UKM), MSc. (Essex), PhD. (Wales), MIEEE, MMSSS

**Research interests:**
Communication and optical systems
Nanotechnology and nanophotonics
Acoustics and optical optical physics, quantum electronics and lasers
Fibre optics and wave guides
Electro-optics and light modulation
Contact: sahbudin@eng.ukm.my

**Prof. Dr. Pankaj K. Choudhury**
BSc. (India); M.Sc. (India); Ph.D. in Physics (India)

**Research interests:**
Optical waveguides of different cross-sectional geometries and/or materials
Complex mediums
Thin film optical waveguides fabrication and characterization
Optical sensors
Photonic crystals
Vertical cavity surface emitting lasers
Contact: pankaj@ukm.my
Dr. P. Sushtitha Menon  
BEng., MSc., PhD. (UKM), MIEEE, MOSA, MSPIE  
Research interests:  
Optical waveguides of different cross-sectional geometries and/or materials  
Complex mediums  
Thin film optical waveguides fabrication and characterization  
Optical sensors  
Photonic crystals  
Vertical cavity surface emitting lasers  
Contact: susi@eng.ukm.my  

Mr. Abang Annuar Ehsan  
B.Eng. (Australia), MSc. (UKM), PhD.(UKM)  
Research interests:  
Contact: aaehsan@eng.ukm.my, @nxphotonics.com  

Mrs. Dilla Duryha Berhanuddin  
BEng. and MEng. from University of Surrey  
Research interests:  
Contact: dduryha@ukm.my, dilla4duryha@yahoo.com
Dr. Azman Jalar is an associate professor of metallurgy and materials from the Faculty of Science and Technology, Universiti Kebangsaan Malaysia. He received SmSn (BSc) in Materials Science from UKM and Ph.D degree in Metallurgy and Materials from the University of Birmingham, United Kingdom. He started his academic career as Tutor at UKM in 1995, then as Lecturer in 2001. He is the Head of Microelectronics Packaging and Materials (MIPAC) Research Group and the current Deputy Director of the Institute of Microengineering and Nanoelectronics (IMEN), UKM. His interest in microstructure-properties-performance motivates him to conduct research in electronic packaging. He also interested in electronic materials, nanomaterials, materialography and stereometry. He has significantly contributed to solving many industrial-related semiconductor packaging problems through industry-driven research activities. He has produced more than 200 publications in various referred journals and proceeding. He is a member of the Institution of Electrical and Electronics Engineer (IEEE), Malaysian Association of Solid State Science and Technology (MASS), Electro Microscopy Society of Malaysia (EMSM) and Akademi Sains Islam Malaysia (ASASI).

Qualifications:
- BSc. (Hons) in Materials Science from Universiti Kebangsaan Malaysia (1995)
- Ph.D in Metallurgy and Materials from University of Birmingham, UK (2001)

Research Interests:
- Microstructure-properties-performance-Relationship of materials
- Electornics Materials
- Materialography and stereometry
- Nanomaterials
Research Theme

Microelectronics Packaging and Materials (MIPAC)

The history for advanced semiconductor packaging research group started since year 2003. The team was lead by Assoc. Prof. Ibrahim Ahmad by doing a research on Under Bump Metallurgy (UBM). This research project was the first collaboration within UKM and On Semiconductor Sdn. Bhd. It was funded by MOSTI based on EA grant in which the total are more than RM 200K. In the end of year 2004, the research group for semiconductor packaging in Malaysia has received an enormous research grant under RM-8 which is the grand total more than RM 26 million. There are several government institutions that involved in this research group which are Universiti Malaya, SIRIM Berhad and Universiti Kebangsaan Malaysia as the lead institution in bringing up all the activities under this research and development programme. RM 13 million out from the grand total research grant are being put under UKM. This includes with advanced equipment purchasing and salary for contract staff and graduate researcher and also consultation fees for the industrial expert. For now, all the researcher from UKM are trying to centralized the research activities by build up a new building in purpose for extra laboratory space, programme monitoring and graduate research assistant logistics. More than RM 7 million has been spent in purchasing the equipment and simulation software. All the purchased equipment and simulation software already being centralized under the laboratory. In early of year 2007, this group was recognized as Advanced Semiconductor Packaging (ASPAC) Research Group by Faculty of Engineering in UKM. This group already received more than RM30K research grant under research university budget in order to continue the research and development programme for advanced semiconductor packaging in UKM.

Member of MIPAC research group:

Assoc. Prof. Dr. Azman Jalar
BSc. (UKM), PhD. (Birmingham), MIEEE

Research interests:
Contact : azmn@ukm.my
Masuri Othman received his BSc from UKM (1978), MSc from University of Essex, UK (1980) and PhD from University of Southampton, UK (1986) in Microelectronics. He became the Head of Electrics, Electronics and System Engineering Department, Faculty of Engineering from 1991-1992 and the deputy dean of the Engineering Faculty from 1998-2003. He was appointed as a professor in Microelectronics System Design in 1996. Masuri Othman was also the chairman of the national committee in Microelectronics which is part of the ASEAN bigger Microelectronics network and has represented Malaysia at many meetings in South East Asia. He has spent sabbatical at Intel in Penang, and attachment at several universities such as the University of East Anglia in England. He has published 3 books in the area of microelectronics and more than 100 papers in international journals and conference proceedings.

Masuri Othman currently is on secondment (since Nov 2006) to MIMOS Berhad as the Chief Research Director for MEMS/NEM, Microenergy and Green Technology group. His research group at MIMOS has produced the world first integrated N,P,K and Moisture sensors that can revolutionize the applications of wireless Sensor Network in areas such as Agriculture and environmental monitoring. The research has won many awards such as Frost and Sullivan Awards in Precision agriculture in 2007, ITEX 2010 Gold medal awards for work in Microenergy and also Special Innovative awards at ITEX 2009 in Wireless Sensor Network. In 2002 he was awarded with the Pingat Ahli Mahkota Kedah by the Sultan of Kedah.

Qualifications:
- BSc. in Physics from Universiti Kebangsaan Malaysia (1978)
- MSc. in Optoelectronics from University of Essex, UK (1980)
- Ph.D in Microelectronics from University of Southampton, UK (1986)

Research Interests:
- Design and implementation of integrated circuits for telecommunications
- On-chip implementation of DSP algorithms
- Development of smart microchips for MEMS interfacing
- Application of VLSI in automotive
Research Theme
Micro and Nanoelectronics Systems

Most of the system design at IMEN involves VLSI with CMOS technology. We are now preparing ourselves to get into the submicron and nanometer system design technology where more components will be packed into a more and more tiny space of area. IMEN focus the research in this field on circuits to assist MEMS devices. The strength of the group is academicians in and outside of the faculty and a team of more than a dozen of research postgraduate students (MSc/PhD).

Research Projects
• Architectural exploration of arithmetic units for DSP & Multimedia
• The development of a Digital Signal Controller – an Enhanced 8051 with DSP capability
• VLSI implementation of high speed FFT processor for UWB Multiband OFDM
• Pulse generation for UWB Sys. Circuit design MCML
• Pulse shaping filter design in UWB comm. sys. Using DA technique
• Design of built in self test diagnoses and repair for SRAMs
• On Chip Implementation of CIC Filter
• Low noise, single supply capacitive sensing amplifies to integrated MEMS sensor
• Comparison of adders for ACS block design of IEEE 802.15.3a UWB Viterbi decoder

Members of Micro and Nanoelectronics Systems research group:
Assoc. Prof. Dr. Md. Shabiul Islam
B.Sc. (RU), M.Sc. (RU), M.Sc. (UKM), PhD. (MMU)

Research interests:
VLSI design
Energy harvesting for ultra-low-power (ULP) electronics devices
Microelectronics
DSP Hardware Implementation on FPGA using VHDL/Verilog/DFL language
FPGA realization based on Fuzzy Logic (FL) algorithm
Embedded system design and interfacing using microcontroller
Contact: shabiul@ukm.my
Gallium arsenide (GaAs) is a compound of two elements, gallium and arsenic. This semiconductor is used to make devices such as microwave frequency integrated circuits, infrared light emitting diodes, laser diodes and solar cells. GaAs has some electronics properties which are superior to silicon’s. It has a higher saturated velocity and higher electron mobility, allowing it to function at frequencies in excess of 250 GHz. Also, GaAs devices generate less noise than silicon devices when operated at high frequencies. They can also be operated at higher power levels than silicon device because they have higher breakdown voltages. These properties recommend GaAs circuitry in mobile phones, WLAN, satellite communications, microwave point-to-point links and some radar systems. It is used in the manufacture of Gunn diodes for generation of microwaves. For this research theme, the group focuses on the development of growth technologies for compound semiconductor materials using molecular beam epitaxy (MBE) and fabrication technologies of high speed devices. Other important activities include investigation of properties and physics of new advanced materials. Collaboration with Telekom Research and Development (TMR&D) in III-V compound semiconductor research has been in progress since 1997. High speed devices such as high electron mobility transistor (HEMT), pseudomorphic HEMT (PHEMT), metamorphic HEMT (MHEMT) and VCSELs are studied especially about the structure of devices and characteristics of epitaxial layers. In advance, tailoring to future needs of green communication technology. Future research studies planned include development of high efficiency PV cells and high speed photodetectors heterostructure materials.

Research Projects

• Epitaxial growth of MHEMT layer using Molecular Beam Epitaxy
• Epitaxial growth of GINA structure for VCSEL

Contact:
Mr. Mohamed Razman Yahya, Telekom R & D Sdn. Bhd (razman@tmrnd.com.my)
Mr. Nurul Afzan bin Omar, Telekom R & D Sdn. Bhd (afzan@tmrnd.com.my)
## Research Grants

<table>
<thead>
<tr>
<th>Name of Main Researcher</th>
<th>Title Of Project</th>
<th>Category</th>
<th>Amount of Fund (RM)</th>
<th>Funding Agency</th>
</tr>
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<tbody>
<tr>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Nanofund: NND/ND/(1)/TD11-002 Development of lab-on chip for peripheral blood stem cell isolation and rapid detection of tropical diseases from blood</td>
<td>National Grant</td>
<td>241,600</td>
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<tr>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>UKM-AP-NBT-10-2009 Lab on Chip for medical applications (Micro Total Analysis System)</td>
<td>University Grant</td>
<td>250,000</td>
<td>UKM/ MOHE</td>
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<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>UKM-OUP-IMEN-2011</td>
<td>University Grant</td>
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<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>UKM-OUP-NBT-27-118/2011 MEMS and Nanoelectronics</td>
<td>University Grant</td>
<td>62,000</td>
<td>UKM/ MOHE</td>
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<tr>
<td>Assoc. Prof. Dr. Jumril Yunas</td>
<td>UKM-GUP-2011-379 Development of MEMS electromagnetic micropump for biomedical implants</td>
<td>University Grant</td>
<td>30,000</td>
<td>UKM/ MOHE</td>
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<tr>
<td>Assoc. Prof. Dr. Jumril Yunas</td>
<td>UKM-GGPM-NBT-087-2010 Development of MEMS actuator using magnetic micro-coil</td>
<td>University Grant</td>
<td>0</td>
<td>UKM/ MOHE</td>
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<tr>
<td>Dr. Azrul Azlan Hamzah</td>
<td>UKM-GGPM-NBT-083-2010 Nanofilter Si untuk penulenan air bagi kitaran semula di kawasan sebar air terhad</td>
<td>University Grant</td>
<td>0</td>
<td>UKM/ MOHE</td>
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<tr>
<td>Dr. Azrul Azlan Hamzah</td>
<td>UKM-GUP-2011-380 MEMS Microgenerator and Storing unit for powering biomedical implants</td>
<td>University Grant</td>
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<td>Dr. Azrul Azlan Hamzah</td>
<td>UKM-GUP-NBT-08-25-084 MEMS untuk sekitaran dan penjana mikro (mems for the environment and micro generator)</td>
<td>University Grant</td>
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<td>Prof. Dr. Ille C. Gebeshuber</td>
<td>UKM-AP-NBT-16-2010 Biomimetic development of a new generation of MEMS in medicine</td>
<td>University Grant</td>
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<td>Name of Main Researcher</td>
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<td>Prof. Dr. Pankaj Kumar Choudhury</td>
<td>FRGS/1/2011/TK/UKM/01/16 Investigation of the transmission characteristics of microstructured optical fibres with speciality designed twists</td>
<td>National Grant</td>
<td>98,000</td>
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<td>Prof. Dr. Pankaj Kumar Choudhury</td>
<td>Dana lonjakan penerbitan UKM-DLP-2011-023 Investigation of the complex propagation characteristics of optical waveguide</td>
<td>University Grant</td>
<td>100,000</td>
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<td>Assoc. Prof. Dr. Dee Chang Fu</td>
<td>UKM-RRR1-07-FRGS0025-2010 Synthesis and characterization of Indium doped ZnO nanowires for gas sensing application</td>
<td>National Grant</td>
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<td>MOHE</td>
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<td>Assoc. Prof. Dr. Dee Chang Fu</td>
<td>UKM-GUP-2011-378 Fabrication of a nanowire field effect transistor for hydrogen gas sensing application</td>
<td>University Grant</td>
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<td>UKM/ MOHE</td>
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<tr>
<td>Dr. Badariah Bais</td>
<td>UKM-RRR1-07-FRGS0258-2010 Synthesization and Characterization of glucose-sensitive hydrogel</td>
<td>National Grant</td>
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<td>Dr. Badariah Bais</td>
<td>UKM-GGPM-NBT-084-2010 Modelling of dynamic behaviour of electrostatically actuated MEMS Microstructure</td>
<td>University Grant</td>
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<td>UKM/ MOHE</td>
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<td>Dr. P. Susthitha Menon</td>
<td>UKM-GGPM-NBT-090-2010 Study and characterization of two-dimensional time-wavelength OCDMA system</td>
<td>University Grant</td>
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<td>Prof. Dr. Sahbudin Shaari</td>
<td>UKM-OUP-NBT-27-119/2011 Photonics and nanophotonics</td>
<td>University Grant</td>
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<td>UKM/ MOHE</td>
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<td>Prof. Dr. Sahbudin Shaari</td>
<td>FRGS/1/2011/TK/UKM/01/17 Broadband source generation utilising four wave mixing phenomenon through the application of photonic crystal fibre</td>
<td>National Grant</td>
<td>162,000</td>
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<td>Prof. Dr. Sahbudin Shaari</td>
<td>UKM-AP-2011-15 Development of nanophotonics sensing technology using nanomaterial-coated waveguide</td>
<td>University Grant</td>
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<td>Prof. Dr. Sahbudin Shaari</td>
<td>UKM-GUP-NBT-08-25-085 Development of optical nanowires with laser source for medical and biology applications</td>
<td>University Grant</td>
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<td>Prof. Dr. Muhamad Mat Salleh</td>
<td>UKM-AP-2011-16 MEMS and nano sensors for biosensing applications</td>
<td>University Grant</td>
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<td>Prof. Dr. Muhamad Mat Salleh</td>
<td>UKM-GUP-2011-376 Light emitting device based on new bio polymer material</td>
<td>University Grant</td>
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<td>Assoc. Prof. Dr. Akrajas Ali Umar</td>
<td>UKM-RRR1-07-FRGS0037-2009 Fabrication of II-VII semiconductors quantum dots-organic hybrids with broadband light-sensitivity characteristic</td>
<td>National Grant</td>
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<td>Assoc. Prof. Dr. Akrajas Ali Umar</td>
<td>UKM-GUP-2011-377 Investigation of localized plasmonic effect on the light energy conversion efficiency of quantum dots organics hybrid photovoli</td>
<td>University Grant</td>
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<td>Assoc. Prof. Dr. Akrajas Ali Umar</td>
<td>UKM-GUP-NBT-08-25-086 Fabrikasi peranti hibrid bintik kuantum-organik</td>
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<td>Prof. Dr. Muhamad Mat Salleh</td>
<td>UKM-GUP-BTT-07-26-178 Fabrikasi peranti luminesens menggunakan teknik cetakan injet</td>
<td>University Grant</td>
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<td>Prof. Emeritus Dato’ Dr. Muhammad Yahaya</td>
<td>UKM-GUP-NBT-08-27-105 Pembangunan filem nipis nanobahan untuk aplikasi sensor kimia, cahaya dan tekanan</td>
<td>University Grant</td>
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<td>Name of Main Researcher</td>
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<td>Prof. Dr. Muhamad Mat Salleh</td>
<td>UKM-OUP-NBT-27-120/2011 Dana Operasi Universiti Penyelidikan</td>
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<td>Prof. Dr. Muhamad Mat Salleh</td>
<td>UKM-RRR1-06-FRGS0002-2007 Fabrication luminescence devices using inkjet printing technique</td>
<td>National Grant</td>
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<td>Prof. Emeritus Dato’ Dr. Muhammad Yahaya</td>
<td>ERGS/1/2011/STG/UKM/01/27 Photonic crystal-organic structure for high-sensitivity carbon monoxide gas sensor</td>
<td>National Grant</td>
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<td>Prof. Emeritus Dato’ Dr. Muhammad Yahaya</td>
<td>UKM-ST-07-FRGS0031-2009 Synthesis and optimization of nanowires gas sensor based on catalyzed/doped heterojunction metal oxide</td>
<td>National Grant</td>
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<td>Dr. Shabiul Islam</td>
<td>UKM-RRR1-02-FRGS0208-2010 Novel ultra-low power circuit for ubiquitous devices</td>
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<td>Dr. Shabiul Islam</td>
<td>UKM-GGPM-NBT-031-2011 Design a low voltage energy SOC system for ultra-low-power bio-medical application</td>
<td>University Grant</td>
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<td>Dr. Shabiul Islam</td>
<td>UKM-GUP-2011-381 MEMS based energy harvester device for low power gadget</td>
<td>University Grant</td>
<td>30,000</td>
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<td>Assoc. Prof. Dr. Azman Jalar</td>
<td>UKM-OUP-NBT-27-121/2011 Kumpulan Pempakejan Mikroelektronik dan Bahan</td>
<td>University Grant</td>
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<td>Assoc. Prof. Dr. Azman Jalar</td>
<td>UKM-GUP-NBT-08-25-087 Membangunkan kaedah perincian bahan pakej dan pakej QFN dai bertingkat</td>
<td>University Grant</td>
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<td>Assoc. Prof. Dr. Azman Jalar</td>
<td>UKM-RRR1-07-FRGS0257-2010 Development of new assessment for realibility and strenght</td>
<td>National Grant</td>
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<tr>
<td>Name of Main Researcher</td>
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<td>Category</td>
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<td>Assoc. Prof. Dr. Azman Jalar</td>
<td>ERGS/1/2011/STG/UKM/02/10 Development of new characterisation technique for micro-mechanical of wire bonding using nanoindentation approach</td>
<td>National Grant</td>
<td>151,548</td>
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<tr>
<td>Dr. Abang Annuar Ehsan</td>
<td>Plastic Optical fiber coupler for fiber in the home (FITH) and automobile system application</td>
<td>National Grant</td>
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<td>MTDC</td>
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<td>Prof. Dr. Ille C. Gebeshuber</td>
<td>Biornametics: Architecture define by nature patterns</td>
<td>International grant</td>
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<td>Industri-2011-015</td>
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<td>Prof. Dr. Sahbudin Shaari</td>
<td>MIMOS Berhad</td>
<td>Industry grant</td>
<td>500,000</td>
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IMEN 2011
Institute of Microengineering and Nanoelectronics
Congratulations to IMEN Graduates of 2011

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<tr>
<th>No.</th>
<th>Name of Graduate</th>
<th>Title of Thesis</th>
<th>Main Supervisor</th>
<th>Degree</th>
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<tr>
<td>1</td>
<td>Javad Karamdel Ajdarali</td>
<td>Growth and Characterization of Well Aligned Catalyst Free ZnO Nanowires</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<tr>
<td>2</td>
<td>Mohd Sharizal Alias</td>
<td>Kondisi Mod Merentas Tunggal dan Diskriminasi Mod Bertertib Tinggi di dalam VCSEL Kristal Fotonik dengan Struktur Parit</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<tr>
<td>3</td>
<td>Nesreen Mahmoud Hammam Ismail</td>
<td>Power Consumption Optimization of the Phase Lock-Loop Module in 2.4 GHz ZIGbee Transceivers</td>
<td>Prof. Dr. Masuri Othman</td>
<td>Ph.D</td>
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<tr>
<td>4</td>
<td>Rozita Teymourzadeh</td>
<td>Novel Architecture of 1024-Point High Speed Floating-point FFT Processor</td>
<td>Prof. Dr. Masuri Othman</td>
<td>Ph.D</td>
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<tr>
<td>5</td>
<td>Aymen M. Karim</td>
<td>Efficient Synchronization for MB-OFOM UWB Systems</td>
<td>Prof. Dr. Masuri Othman</td>
<td>Ph.D</td>
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<tr>
<td>6</td>
<td>Wan Fazlida Hanim Abdullah</td>
<td>Development of CHEMFET Post-processing Stage</td>
<td>Prof. Dr. Masuri Othman</td>
<td>Ph.D</td>
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### IMEN Post-Doctorate Fellow 2011

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<tr>
<th>Bil</th>
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<th>Name of Supervisor</th>
<th>Report Title</th>
<th>Date Start</th>
<th>Date End</th>
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<tr>
<td>1</td>
<td>Mitra Damghanian</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>MEMS Microphone</td>
<td>Mac 2010</td>
<td>Februari 2011</td>
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## IMEN Postgraduate Students 2011

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Student</th>
<th>Academic Background</th>
<th>Research Project</th>
<th>Supervisor</th>
<th>PhD/Msc</th>
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<tbody>
<tr>
<td>1</td>
<td>Juliana Johari</td>
<td>Micropump for bioMEMS application</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<tr>
<td>2</td>
<td>Mohd HS Al Rashdan</td>
<td>MEMS microgenerator</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<td>3</td>
<td>Husam Ahmed M. Elgomati</td>
<td>Glucose sensor for biomedical applications</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<td>4</td>
<td>Rosminazuin Abd. Rahim</td>
<td>Design by constraint in solid modelling with the aid of UNIGRAPHICS software</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<tr>
<td>5</td>
<td>Nadzril Sulaiman</td>
<td>MEMS microspeaker</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<td>6</td>
<td>Ali Reza Bahadorimehr</td>
<td>Lab-on-Chip for immunity disease detection</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<td>7</td>
<td>Jafar Alvankarian</td>
<td>MEMS shear stress sensor</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<td>8</td>
<td>Norihan Abd Hamid</td>
<td>MEMS thermal actuated micro-pump</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis &amp; Assoc. Prof. Dr. Jumril Yunas</td>
<td>Ph.D</td>
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<td>9</td>
<td>Abrar Ismardi</td>
<td>Synthesis and characterization of indium doped ZnO nanowires for gas sensing application</td>
<td>Dr. Dee Chang Fu</td>
<td>Ph.D</td>
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<tr>
<td>No.</td>
<td>Name of Student</td>
<td>Academic Background</td>
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<td>11</td>
<td>Benyamin Davaji</td>
<td></td>
<td>BioMEMS for stem cell isolation</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
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<tr>
<td>12</td>
<td>Ummikalsom binti Abidi</td>
<td></td>
<td>High gradient magnetic field device for bioparticles separator</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>13</td>
<td>Mohammad Mahdi Vakilian</td>
<td>B.Engg./Sc. in Electronic (Iran) (2004) MSc. in Electronics (UKM) (2011)</td>
<td>Lab-on-Chip for bioparticles detection</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>14</td>
<td>Marianah binti Masrie</td>
<td></td>
<td>Mems bioparticles detection with optical transducer for LOC applications</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>15</td>
<td>Tiong Teck Yaw</td>
<td></td>
<td>Development of nanowires based field-effect transistor for chemical &amp; biosensor application</td>
<td>Dr. Dee Chang Fu</td>
<td>Ph.D</td>
</tr>
<tr>
<td>16</td>
<td>Norazreen binti Abd Aziz</td>
<td>BEng. (Surrey), MSc. (UKM)</td>
<td>Bioparticles separation in microfluidic using surface acoustic waves</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>17</td>
<td>Muhamad Ramdzan Buyong</td>
<td>BEng. (Surrey), MSc. (UKM)</td>
<td>Dielectrophoretic biochip for biological particles characterization tool</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>18</td>
<td>Noraini Marsi</td>
<td>B.Engg., in Mech. (Mat.) (UTM) (2009) MEngg. in Mech. (UTHM) 2011</td>
<td>Development of high temperature resistant silicon carbide (SiC) based MEMS pressure sensor for monitoring gas turbine performance</td>
<td>Prof. Dato’ Dr. Burhanuddin Yeop Majlis</td>
<td>Ph.D</td>
</tr>
<tr>
<td>19</td>
<td>Siti Zaleha binti Mat Diah</td>
<td>BSc. in Ecology &amp; Biodiversity (UM)(2004) MSc. in Animal Ecology (UM) 2008</td>
<td>Applied biomimetics development of a new generation of MEMS for enhancing human sensory perception</td>
<td>Prof. Dr. Ille C. Gebeshuber</td>
<td>Ph.D</td>
</tr>
<tr>
<td>No.</td>
<td>Name of Student</td>
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<td>20</td>
<td>Salmah binti Karman</td>
<td></td>
<td>Biomimetics development of a new generation of MEMS in enhancing the human sensory</td>
<td>Prof. Dr. Ille C. Gebeshuber</td>
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<tr>
<td>21</td>
<td>Abdullatif Mohammed Abdullah Alsharjabi</td>
<td></td>
<td>Two core optical amplifier EDFA in the optical transmission system</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<td>23</td>
<td>Mohd Fared bin Abdul Khir</td>
<td></td>
<td>Polarization stabilization in optical fiber</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<tr>
<td>24</td>
<td>Muchlis Abdul Muthalib</td>
<td></td>
<td>Next generation optical network performance</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
</tr>
<tr>
<td>26</td>
<td>Hazura binti Haroon</td>
<td>BEng. in Telecommunications (UTM) MEng. in Electronics &amp; Telecommunications (UTM)</td>
<td>Passive ring resonator as optical storage</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
</tr>
<tr>
<td>27</td>
<td>Mardiana binti Bidin</td>
<td></td>
<td>Study on the effect of voltage and current on active microring</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<tr>
<td>28</td>
<td>Hanim binti Abdul Razak</td>
<td></td>
<td>Current injection in optical Mach Zehnder optical modulator</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
</tr>
<tr>
<td>29</td>
<td>Isaac A. M. Ashour</td>
<td></td>
<td>Development of WDM and OCDMA hybrid optical network</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<td>No.</td>
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<tr>
<td>30</td>
<td>Ali Z. Ghazi Zahid</td>
<td>BSc. in Computer (Al-Fateh)(2002) MSc. in Microengineering and Nanoelectronics (UKM)</td>
<td>New algorithm for the security enhancements of biometric authentication recognition systems</td>
<td>Dr. Mandeep Singh</td>
<td>Ph.D</td>
</tr>
<tr>
<td>31</td>
<td>Affa Rozana binti Abdul Rashid</td>
<td>BEng. in Electrical &amp; Electronics (UKM) (2008) MSc. in Microelectronics (UKM) (2009)</td>
<td>Photoconductivity studies on ZnO/TiO2 nanocrystals</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
</tr>
<tr>
<td>32</td>
<td>Wan Maisarah binti Mukhtar</td>
<td></td>
<td>Fabrication of low loss silica nanofiber using tapering technique</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
</tr>
<tr>
<td>33</td>
<td>Selmani Sofiane</td>
<td></td>
<td>Simulation Emission in SiO2 Doped Er/Yb Coated with Gold for Coherent Spherical Wave Light Source</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>Ph.D</td>
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<tr>
<td>34</td>
<td>Afifah Maheran binti Abdul Hamid</td>
<td></td>
<td>Study and Modelling of High-k Material for gate of 22nm CMOS device</td>
<td>Dr. P. Susthitha Menon</td>
<td>Ph.D</td>
</tr>
<tr>
<td>35</td>
<td>Marlia Morsin</td>
<td></td>
<td>Organic transistor</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>Ph.D</td>
</tr>
<tr>
<td>36</td>
<td>Vivi Fauzia</td>
<td></td>
<td>Organic solar cell fabrication based on P3HT/PCBM material</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>Ph.D</td>
</tr>
<tr>
<td>37</td>
<td>Siti Salwa binti Zainal Abidin</td>
<td></td>
<td>Organic solar cell fabrication from bio-organic material</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>Ph.D</td>
</tr>
<tr>
<td>38</td>
<td>Norhayati Abu Bakar</td>
<td></td>
<td>Infra red organic gas sensing using nanoparticles metal and biology materials</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>Ph.D</td>
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<td>No.</td>
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<tr>
<td>39</td>
<td>Yazan Samir Kasim</td>
<td>BSc. in Computer Science and Engg. (AUST) 2002 MEngSc. in Microelectronics (Multimedia) 2009</td>
<td>VLSI implementation of high speed fast fourier transform using digital slicing architecture</td>
<td>Prof. Masuri Othman</td>
<td>Ph.D</td>
</tr>
<tr>
<td>40</td>
<td>Mohammad Shaharia Bhuyan</td>
<td>BSc. in Computer Science and Engg. (AUST) 2002 MEngSc. in Microelectronics (Multimedia) 2009</td>
<td>Design of MEMS based energy harvester for low power electronic device</td>
<td>Dr. Mohd. Shabiul Islam</td>
<td>Ph.D</td>
</tr>
<tr>
<td>41</td>
<td>Muhammad Nubli bin Zulkifli</td>
<td>BEng. in Electronics (USM) (2005) MSc. in Microelectronics (UniMAP) (2008)</td>
<td>Nanoindentation approach in evaluation of wire bonding interconnection</td>
<td>Assoc. Prof. Dr Azman Jalar</td>
<td>Ph.D</td>
</tr>
<tr>
<td>42</td>
<td>Nor Illiani Ramzi</td>
<td>BEng. in Microelectronics (UKM) 2007</td>
<td>Microprobe for wafer testing application</td>
<td>Prof. Dato' Dr. Burhanuddin Yeop Majlis</td>
<td>MSc.</td>
</tr>
<tr>
<td>43</td>
<td>Hafzaliza Erny Zainal Abidin</td>
<td>BSc. in Physics (UPM) 2007</td>
<td>Microenergy conversion and storing unit for powering biomedical implants</td>
<td>Dr. Azrul Azlan Hamzah</td>
<td>MSc.</td>
</tr>
<tr>
<td>45</td>
<td>Nor Azrina Dzulkefl</td>
<td>BEng in Electronics (Surrey) 2005</td>
<td>Development of encoder and decoder module for optical code division multiple access (OCDMA) systems based on arrayed waveguide grating (AWGs)</td>
<td>Prof. Dato' Dr. Burhanuddin Yeop Majlis</td>
<td>MSc.</td>
</tr>
<tr>
<td>46</td>
<td>Syed Mohamad Hamzah Al-Junid bin Syed Abdul Rahman</td>
<td>BEngg. Electronics (1st Class) (UMP)(2006)</td>
<td>Development of encoder and decoder module for optical code division multiple access (OCDMA) systems based on arrayed waveguide grating (AWGs)</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>MSc.</td>
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<tr>
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<td>47</td>
<td>Zalhan binti Md Yusof</td>
<td></td>
<td>Polarization state characteristics in optical fibre</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>MSc.</td>
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<tr>
<td>48</td>
<td>Mohd Nizam Abdullah</td>
<td></td>
<td>Kesan kehadiran gentian kristal fotonik ke atas penjanaan campuran empat gelombang</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>MSc.</td>
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<tr>
<td>49</td>
<td>Mohd Norzaliman bin Mohd Zain</td>
<td></td>
<td>Free space polarization encoded Quantum Key Distribution with decoy state</td>
<td>Prof. Dr. Sahbudin Shaari</td>
<td>MSc.</td>
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<td>50</td>
<td>Aidiha Rahmi</td>
<td></td>
<td>Solar cell using hybrid of quantum dot and organic material</td>
<td>Assoc. Prof. Dr. Akrajas Ali Umar &amp; Prof. Dr. Muhamad Mat Salleh</td>
<td>MSc.</td>
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<tr>
<td>51</td>
<td>Mohd Shahrul Akram bin Mokhtar</td>
<td>BEng. in Comm. &amp; Computer UKM</td>
<td>Kesan adunan garam organik dalam bahan polimer oemancar poli (9,9-di-n-heksilfluorenil-2,7-diil) terhadap prestasi peranti OLED lapisan tunggal</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>MSc.</td>
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<td>52</td>
<td>Muhammad Yunus bin Ahmad Mazuki</td>
<td></td>
<td>Light emitting diode of bio-organic material hybrid</td>
<td>Prof. Dr. Muhamad Mat Salleh &amp; Prof. Madya Dr. Akrajas Ali Umar</td>
<td>MSc.</td>
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<td>53</td>
<td>Mahidur Rahman Sarker</td>
<td></td>
<td>Design a low voltage energy harvesting SoC system for ultra-low-power bio-medical applications</td>
<td>Dr. Mohd. Shabiul Islam</td>
<td>MSc.</td>
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</tbody>
</table>
Patent Pending and Granted 2007-2011

Publication 2006 - 2011
Total Student 2007-2011

Total IMEN Graduate Student
IMEN PhD Student 2007-2011

IMEN Master Student 2007 - 2011
Events
Institute of Microengineering and Nanoelectronics
NanoMalaysia Centre of Excellence

IMEN is chosen as one of the country’s nanotechnology centre of excellence by MOSTI. The award was presented by the Minister of Science, Technology and Innovation, YBhg. Dato’ Dr. Maximus Ongkili on 15 July 2011 at the NanoMalaysia Summit and Expo 2011 held at the Putra World Trade Centre (PWTC). Out of 17 applications, the other four selected Nano Malaysia CoE are the Institute of Nanoengineering UniMAP, the Ibnu Sina Institute UTM, MIMOS Berhad and the Centre of Innovative Nanostructures & Nanodevices (COINN) UTP. We are humbly honored to be recognized for our contribution and continuous efforts in R&D on nanotechnology notably in MEMS and sensors and are further motivated to maintain our role as major player in science and education.
Overview
Foreword from The Director
Organization
Profile of Principal Fellows
Research Themes
Research Grants
IMEN 2011
Publications
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Events of IMEN 2011

International Workshop on ‘Nanotechnology in the Edge of Convergence’
IMEN coorganized the International Workshop on ‘Nanotechnology in the Edge of Convergence’, at Puri Pujangga UKM on 24-27 November 2011, in collaboration with COMSATS and the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), India. The event was co-sponsored by the United Nations Educational, Scientific and Cultural Organization (UNESCO). IMEN hosted the four day workshop that brought together participants from 19 developing countries such as Algeria, Bangladesh, Bulgaria, Cambodia, Mesir, India, Pakistan, Sudan, Indonesia, Iraq, Kenya, Malawi, Mauritius, Myanmar, Nepal, Tunisia, Uganda, Vietnam and Malaysia. The objectives of the workshop are to present each country’s activities in nanotechnology R&D, discuss recent advancements in the field of nanotechnology, exchange nanotechnology expertise and technical know-how and to build linkages between nanotechnology R&D centers in developing countries. The inauguration ceremony was attended by the UKM Deputy Vice Chancellor in Academic and International Affairs YBhg. Prof Datuk Dr. Noor Azlan Ghazali, Prof. Dr. Arun P. Kulshreshtha, Director, NAM S&T Centre India, Dr. Arshad Saleem Bhatti, Dean, Faculty of Science, COMSATS Institute of Information Technology (CIIT) Pakistan, Prof. Dr. Halimaton Hamdan, Director of National Nanotechnology Directorate, MOSTI and Mr. Mohd. Zulkifli Hashim, Executive Secretary, Malaysian National Commission of UNESCO.

The 5th Korea-Malaysia Joint Workshop on Nanotechnology, October 20, 2011
1. The delegate from IMEN presented their research works together with researchers from Seoul National University and Kyungpook National University in front of 80 students from both universities in Do-yeon Hall, Inter-University Semiconductor Research Center, SNU.
2. The IMEN delegate was a given a rare opportunity to tour the products manufacturing facilities at Samsung Electronics. The tour was arranged by Prof. Dr. Jong Duk Lee who has been special consultant for Samsung since 1985.

The 5th IMEN-LIPI Joint Seminar on Microelectronic Devices, Systems and Instrumentations
The IMEN-LIPI Joint Seminar on Microelectronic Devices, Systems and Instrumentations was held in 15-16 November 2011 at the Hotel Inna Garuda, Yogyakarta Indonesia. The seminar further strengthens our friendship and we had a wonderful time sharing knowledge with our friends from LIPI.
Events IMEN 2011

International Workshop on ‘Nanotechnology in the Edge of Convergence’
Puri Pujangga UKM
24-27 November 2011

The 5th IMEN-LIPI Joint Seminar
Yogjakarta, Indonesia
Nov 15, 2011

Korea-Malaysia Joint Workshop on Nanotechnology 2011
Seoul National University, Korea
October 2011

Alumni Dinner and celebration of IMEN’s 10th Year Birthday
Sep 23, 2011
Equatorial Bangi-Putrajaya Hotel

NANO Malaysia Summit 2011
Jun 14, 2011
Putra World Trade Centre, Kula Lumpur

UKM-MOTOROLA Collaborative Meeting
Apr 14, 2011
IMEN at UKM-MTDC, UKM

Public Lecture Prof Ille C. Gebeshuber “Biomimetics and Nanotechnology”
April 14, 2011
Senate Room, Chancellory Building, UKM

Abstract: One of the fascinating aspects of nanotechnology is that on the nanometre scale all the natural sciences meet and intertwine. Physics meets life sciences as well as engineering, chemistry, materials science and computational approaches, which altogether communicate and are closely linked. This inherent interdisciplinarity of nanotechnology offers enormous potential for fruitful crossfertilisation in specialist areas. Biomimetics is a prominent research area at the meeting place of life sciences with engineering and physics. Biomimetics deals with knowledge transfer from living nature to technology: underlying principles are identified and subsequently transferred to and applied in science, engineering and medicine. Nature excels at combining materials, structures and processes. Biomimetic nanotechnology is a continuously growing field that deals with knowledge transfer from biology to nanotechnology. Investigations of organisms on the nanoscale have wide ranging implications for the understanding of processes in healthy and health impaired living beings and ecosystems and yield novel approaches in engineering and medicine. Biomimetic nanotechnology is a field that has the potential to drive major technical advances and that might substantially support successful mastering of major global challenges. The scope of this lecture is to highlight research work performed by the author at the Institute of Microengineering and Nanoelectronics at the Universiti Kebangsaan Malaysia in the years 2009 and 2010. Bioinspired MEMS, a new concept for niche tourism in Malaysia (concerning innovation in nanomaterials engineering) and a novel concept for dynamic ways of scientific publishing and accessing human knowledge inspired by transdisciplinary approaches are treated in detail. The key objectives of these activities are to strengthen Malaysia as a research location and to determine new ways of doing and presenting science that are accessible for all.
Mems & Nanoelectronics

ISI/Scopus Indexed Journals


ISI/Scopus Indexed Proceedings


Photonics & Nanophotonics

ISI/Scopus Indexed Journals


**ISI/Scopus Indexed Proceedings**


Organic and Printed Electronics

ISI/Scopus Indexed Journals


ISI/Scopus Indexed Proceedings


Microelectronics Pckagangelg And Materials (Mipac)

ISI/Scopus Indexed Journals


ISI/Scopus Indexed Proceedings


Micro and Nanoelectronics Systems

ISI/Scopus Indexed Journals


ISI/Scopus Proceedings


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