ANNUAL REPORT 2012

Institute Of Microengineering & Nanotechnology
Universiti Kebangsaan Malaysia

Annual Report 2012

CONTENT

OVERVIEW

Institute Of Microengineering & Nanotechnology

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 dode) 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.

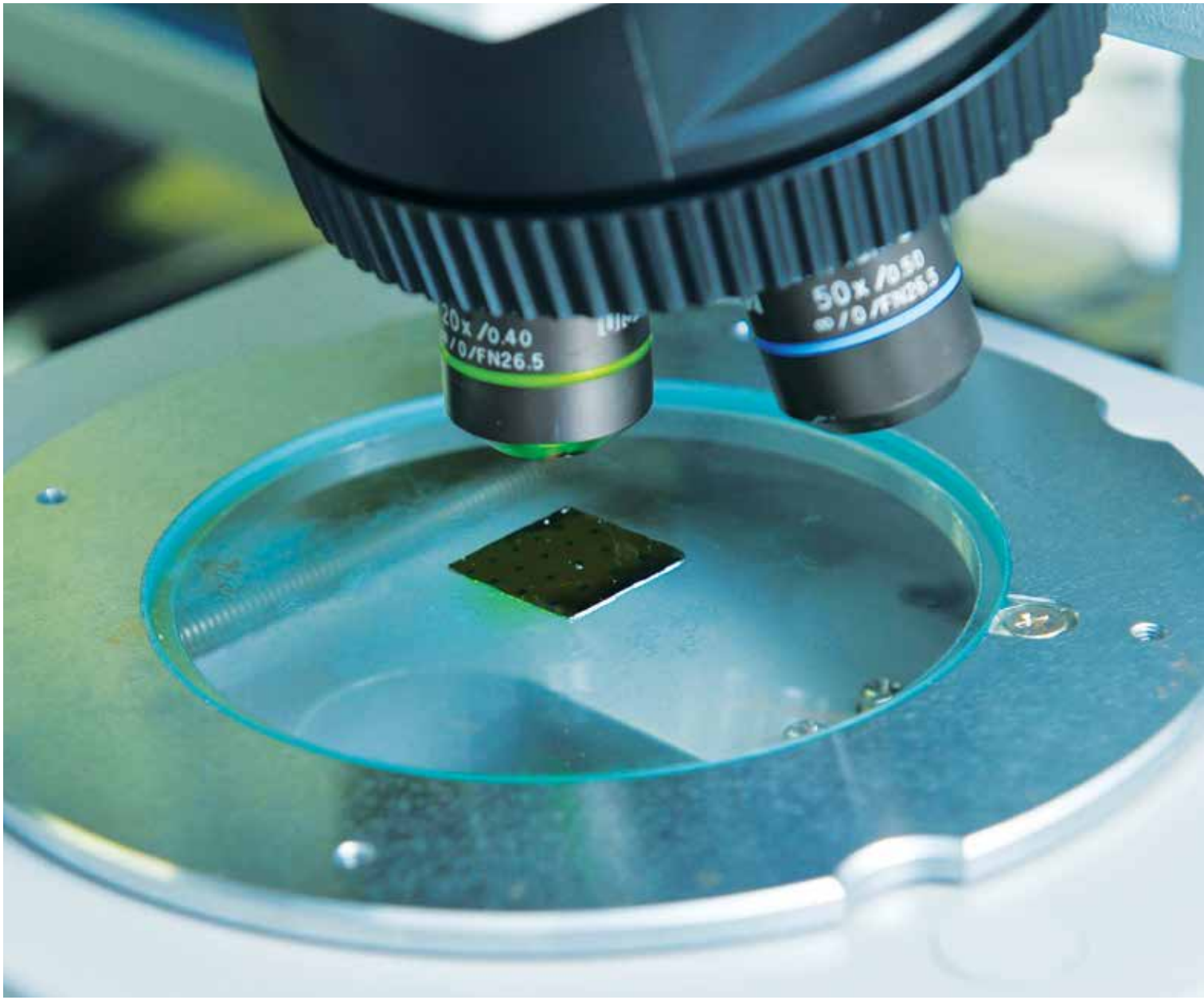
In 1993, Telekom Malaysia R&D Sdn. Bhd. (TMR&D) recognized the cleanroom and presented UKM a RM 1 million grant to upgrade the cleanroom into microelectronics research centre called UKM-TM Microfabrication Laboratory. All activities were centered on fabrication using silicon technology. The lab also 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 Microenineering 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.

imen

MEMS and Nanoelectronics
Organic and Printed Electronics
Photonics Technology and Nanophotonics
Microelectronics Packaging and Materials
MBE Technology and III-V Compound Semiconductor
Micro and Nanoelectronic Systems


20x /0.40
/0/FN26.5
50x /0.80
∞/0/FN26.5

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 and Nanoelectronics
- Photonics and Nanophotonics
- Organic and Printed Electronics
- Microelectronics Packaging
- Micro and Nanoelectronic Systems

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

01 To strengthen and enrich knowledge in micro and nanoelectronics, micro-electromechanical systems / nano- electrome chanical systems (MEMS & NEMS), advanced devices, MEMS & nanotechnology systems, organic & printed electronics, advanced packaging technology, and photonics & nanophotonics through research and development activities.

02 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.

03 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.

04 To promote public awareness of the contributions of microelectronics in developing the nation by organizing public lectures, seminars and outreach programs, and publications.

05 To strengthen national and international networks thus putting Malaysia in global perspective.

FOREWORD FROM THE DIRECTOR

This Annual Report describes the research activities of the Institute of Microengineering and Nanoelectronics as well as its collaborations with academic institutions and industry during 2012.

2012 was a special year for the Institute in two respects. For one, it was the tenth anniversary of institute's establishment back in November 2002. It was also a busy year as the institute had to organize three important events namely the annual workshops between IMEN-LIPI and IMEN-Inter-University Semiconductor Research Centre Korea respectively and an international conference jointly organized with Electron Devices Chapter, IEEE Malaysia Section. IMEN also moved into a new 'house' this year.

In July 2012, staff began the move into IMEN's new office on the 4th floor at the new UKM Research Complex, with new purpose built laboratories. The new research complex building is built from the RM 10 million grant IMEN received from the Ministry of Higher Education as an incentive to enhance our research capabilities and strength in areas such as MEMS, lab-on-chip, biomimetics, nanoelectronics, microelectronics packaging and materials, and organic electronics since each group will have new bigger labs. The complex will be shared with several other UKM research institutes. However the MEMS microfabrication lab, MBE technology lab and photonics technology lab would remain at their original locations in the Faculty of Engineering and Built Environment since most equipment have been permanently placed.

IMEN students were privileged this year to be able to attend four technical lectures from three distinguished researchers. Prof. Dr. Akhlesh Lakhtakia, the Charles Godfrey Binder (Endowed) Professor of Engineering Science and Mechanics at the Pennsylvania State University, USA came to IMEN in January to deliver two very interesting lectures. The first one was on sculptured thin films and the second lecture was about surface multiplasmonics. We then invited him to be IMEN's visiting professor at the institute later in September 2012. Prof Yoon Soon Fatt from Nanyang Technical University Singapore gave a lecture in February 2012 on the advanced technology of dilute nitride-antimonide semiconductor alloys for high speed micro and nanosystems. Then in May 2012, Prof. Jakub Kedzierski of Massachusetts Institute of Technology presented a lecture that took the audience on a memory trip of the journey from the classical bulk CMOS to metal-gate FinFETs. The lectures were very much enjoyed by the audience and many left with deeper appreciation of the knowledge imparted. We wish to bring more distinguished scientists to UKM to share their knowledge with us.

Seven persons graduated from the Institute with PhD in Microengineering and Nanoelectronincs and seven graduate students received their MSc degree. Their theses are huge contribution to the university's research output and significant to the institute's development as a NanoMalaysia centre of excellence. Currently IMEN has 55 PhD students and 16 Masters students. To date IMEN has produced 32 Masters students and 25 PhD students.

September was a very hectic month because three events were organized concurrently. The 12th IEEE International Conference on Semiconductor Electronics (IEEE-ICSE2012) was held from 19-21 September at the Grand Millennium Hotel Kuala Lumpur. The Malaysia-Korea Workshop on Nanotechnology took place on 20 September followed by the IMEN-LIPI Joint Seminar on the next day. The ICSE2012 conference was jointly organized with Electron Devices Chapter, IEEE Malaysia Section and Malaysia Nanotechnology Association. I am happy to note that all events went well. The workshops with our counterparts from SNU and KNU Korea and also from LIPI were successful in bringing us closer and valuable knowledge has been shared throughout our friendships since 2007.

I would like to thank all institute members, staff and students for their dedication and enthusiasm in their own work and all other activities of IMEN. May IMEN grow to become into what I have been envisioned for it at its conception in 2002: be a world class research institute in microengineering and nanoelectronics that contributes prominently to the university and nation in terms of knowledge, technological advancement and human capital.

PROF. DATO' DR. BURHANUDDIN YEOP MAJLIS
Director
IMEN UKM

ORGANIZATION

Institute Of Microengineering & Nanotechnology

IMEN PRINCIPAL AND RESEARCH FELLOWS

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

IMEN ADMIN/ TECHNICAL & SUPPORT STAFF

Research Staffs

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

Admin Staffs

16. **Muhammad Aizuddin Saharudin,**
    BBA (Uniten) – Assistant Registrar
17. **Jumaah binti Abdul Aziz,**
    Secretary
18. **Mohd. Fahmi bin Mohamad Mustafa,**
    Admin. Assistant
19. **Faeizah Buang, Admin,**
    Assistant
20. **Hazde Akmar bin Mohd Salleh,**
    General Office Assistant

2012 Graduates

The following students successfully completed their studies in the past year:

Doktor Falsafah (Kejuruteraan Mikro dan Nanoelektronik) Universiti Kebangsaan Malaysia		
Name of Graduate	Title of Thesis	Supervisor
Dr. Rosminazuin Ab. Rahim	*Process Development for Piezoresistive Microcantilever Biosensor*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Dr. Alireza Bahadorimehr	*Magnetic Microparticle Separation in Lab on a Chip System for Biomolecule Detection Applications*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Dr. Husam Ahmed M. Elgomati	*Optimization of Process Parameters for 32nm CMOS Device*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Dr. Hesham Abdullah A. Bakarman	*Security Performance and Enhamcement for Spectral Amplitude Coding Optical Code Division Multiple Access Networks*	Prof. Dr. Sahbudin Shaari
Dr. Mohd Fared Abdul Khir	*Sistem Perkongsian Kekunci Kuantum Berasaskan Protokol Dua Hala dan Kaedah Umpanan / Quantum Key Distribution System based on Two-Way Protocol and Decoy State*	Prof. Dr. Sahbudin Shaari
Dr. Abang Annuar Ehsan	*Rekabentuk dan Fabrikasi Pengganding Gentian Optik Plastik Jenis Cabang-Y dengan Nisbah Gandingan Boleh Ubah / Design and Fabrication of Y-branch Type Plastic Optical Fiber with Variable Coupling Ratio*	Prof. Dr. Sahbudin Shaari
Dr. Zainudin Komain	*Process Development for Piezoresistive Microcantilever Biosensor*	Assoc. Prof. Dr. Azman Jalar

Sarjana Sains (Kejuruteraan Mikro dan Nanoelektronik) Universiti Kebangsaan Malaysia		
Name of Graduate	Title of Thesis	Supervisor
Tina Rezaie Matin	*Biomemetics of Nanostructures Concerning Structural Colours*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Mohd Nizam Abdullah	*Kesan Kehadiran Gentian Kristal Fotonik ke atas Penjanaan Campuran Empat Gelombang / Effects of Photonics Crystal Fibers on Four Wave Mixing Constructions*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Sri Nengsih	*Penderiaan Formalin mengunakan Filem Nipis Emas Nanopartikel / Formaline Sensing using Gold Nanoparticles Thin Film*	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Aidhia Rahmi	*Fabrikasi Sel Suria Menggunakan Hibrida Bahan Bintik Kuantum dan Organikr*	Prof. Dr. Sahbudin Shaari
Liszulfah Roza	*Effect of TiO2 Nanostructure Morphology on the Performance of Photoelectrochemical Cell*	Prof. Dr. Sahbudin Shaari
Noor Elisurianie Salehudin	*Kuantitatif Stereologi Terhadap Morfologi Kerapuhan dan Kemuluran bagi Aloi Aluminium*	Prof. Dr. Sahbudin Shaari
Muhammad Faizol Ahmad Ibrahim	*Mekanisma Pembentukan Keliangan Kimpalan Aluminium AA6063*	Assoc. Prof. Dr. Azman Jalar

IMEN Postgraduate Students

Student Name		Title of Thesis	Supervisor
Juliana Johari	B.Engg. In Electrical Engg (Strathclyde) (1992), MSc. in Biomed Engg (Surrey) (2001)	Micropump for bioMEMS application	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Mohd HS Al Rashdan	B.Eng. in Biomedical Engg. (JUST) (2006) , MSc. in Microelectronics (UKM) (2007)	MEMS microgenerator	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Nadzril Sulaiman	B.Eng. (Hons) in Electronics and Electrical Engineering, (Portsmouth) (1997) MSc. in Advanced Manufacturing Technology, (Portsmouth)(1998)	MEMS micromagnetometer	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Gandi Sugandi	Strata I (UNJANI)(2000), Strata II (ITB) (2005)	MEMS microfluidic mixer	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Jafar Alvankarian	B.Sc. and M.Sc. in Aerospace Engg. (Amirkabir) (1997)	MEMS shear stress sensor	Prof. Dato' Dr. Burhanuddin Yeop Maj
Norihan Abd Hamid	BSc. in Electrical Engineering (Hanyang)(1999) MEngg. Comp. and Communication (UKM)(2004)	MEMS thermal octuala for pump	Prof. Madya Dr. Jumril Yunas
Abrar Ismardi	BS2c.in Physics (Padjadjaran University, Bandung)(2005) MSc. in Applied Physics (UKM) (2008)	Synthesis and characterization of Indium doped ZnO nanowires for gas sensing application	Prof. Madya Dr.Dee Chang Fu
Benyamin Davaji	B.Sc. in Electronics Engg (Azad) (2007), MSc. in Electronics Engg (Azad) (2010)	BioMEMS for stem cell isolation	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Ummikalsom Binti Abidi	B.Engg. in Mech Engg (UTM) (2002), MEngg. in Mech Engg (UTM)(2006)	High gradient magnetic field device for bioparticles separator	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Mohammad Mahdi Vakilian	B.Engg./Sc. in Electronic (Iran) (2004) MSc. in Electronics (UKM) (2011)	BioMEMS drug delivery system	Prof. Dato' Dr. Burhanuddin Yeop Majlis

Student Name		Title of Thesis	Supervisor
Tiong Teck Yaw		Development of nanowires based field-effect transistor for chemical & biosensor application	Prof. Madya Dr. Dee Chang Fu
Norazreen binti Abd Aziz	BEng. (Surrey), MSc. (UKM)	Bioparticles separation in microfluidic using surface acoustic waves	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Marianah Binti Masrie	Sm.Kej. in Electrical Engg (UKM) (1997), MSc. in Electrical Engg (UiTM) (2005)	MEMS bioparticles detection with optical transducer for LOC applications	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Noraini Marsi	B.Engg. in Mech. (Mat.) (UTM) (2009), MEngg. in Mech. (UTHM) (2011)	Silicon carbide	Prof. Madya Dr. Azrul Azlan Hamzah
Muhamad Ramdzan Bin Buyong	BEng. (Surrey), MSc. (UKM)	Dielectrophoretic biochip for biological particles characterization tool	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Mohammad Zayed Ahmed Abo al Keshek	BSc. in Electrical Engg (Baghdad) (2003), MSc. In Electronics (USM) (2007)	MEMS	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Norani binti Atan		Optimization of CMOS 22nm	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Siti Zaleha binti Mat Diah	BSc. in Ecology & Biodiversity (UM) (2004) MSc. in Animal Ecology (UM) (2008)	Applied biomimetic development of a new generation of MEMS for enhancing human sensory perception	Prof. Dr. Ille C. Gebeshuber
Salmah binti Karman	BEngg. (Oita), MEngg. (UM)	Biomimetic development of a new generation of MEMS in enhancing the human sensory system	Prof. Dr. Ille C. Gebeshuber
Muchlis Abdul Muthalib	B.Engg./Sc. in Electronic (Iran) (2004) MSc. in Electronics (UKM) (2011)	Next generation optical network performance	Prof. Dr. Sahbudin Shaari

Student Name		Title of Thesis	Supervisor
Hazura Binti Haroon	BEng. in Telecommunications (UTM) MEng. in Electronics & Tele-communications (UTM)	Passive ring resonator as optical storage	Prof. Dr. Sahbudin Shaari
Mardiana Binti Bidin	Sm.Kej. in Electrical, Electronics & Systems (UKM) (2003), Sarjana Sains in Microelectronics (UKM) (1999)	Study on the effect of voltage and current on active microring	Prof. Dr. Sahbudin Shaari
Hanim Binti Abdul Razak	Sm.Kej. in Electrical Engg (UKM) (1997), MSc. in Electrical Engg (UiTM) (2005)	Current injection in optical Mach Zehnder optical modulator	Prof. Dr. Sahbudin Shaari
Isaac A. M. Ashour	B.Engg. in Mech. (Mat.) (UTM) (2009), MEngg. in Mech. (UTHM) (2011)	Development of WDM and OCDMA hybrid optical network	Prof. Dr. Sahbudin Shaari
Ali Z. Ghazi Zahid	BEng. (Surrey), MSc. (UKM)	New algorithm for the security enhancements of biometric authentication recognition systems	Dr. Mandeep Singh
Affa Rozana Binti Abdul Rashid	BSc. in Electrical Engg (Baghdad) (2003), MSc. In Electronics (USM) (2007)	Photoconductivity studies on ZnO/TiO2 nanocrystals	Prof. Dr. Sahbudin Shaari
Wan Maisarah Binti Mukhtar	BSc. in Comp Physics & Electronics (UM) (2004), MSc. in Energy Tech (UKM) (2009)	Fabrication of low loss silica nanofiber using tapering technique	Prof. Dr. Sahbudin Shaari
Afifah Maheran binti Abdul Hamid	BEngg. in Electronics (UTEM) (2006), MSc. in Microelectronics (UKM) (2008)	Study and modelling of High-k Material for gate of 22nm CMOS device	Dr. P. Susthitha Menon
Khadijah Binti Ismail	BEngg. in Electrical Engg. (UiTM) (2006), MSc. in Telecommunications & Info (UiTM) (2008)	Performance analysis of full spectrum CWDM system amplification	Dr. P. Susthitha Menon
Mohd Nizam Bin Abdulla	BSc. in Physics (UTM) (1999), MSc. in Microengg. & Nanoelectronics (UKM) 2013		Prof. Dr. Sahbudin Shaari

Student Name		Title of Thesis	Supervisor
Nurjuliana Juhari	BSc. (UM) (2003), MSc. (UM) (2007)		Prof. Dr. Sahbudin Shaari
Muhammad Abuzar Baqir		Electromagnetic behaviour of complex optical structures	Prof. Dr. Pankaj K. Choudhury
Masih Ghasemi Goorbandi		Investigation of the propagation of electromagnetic waves in complex optical micro/nano structures	Prof. Dr. Pankaj K. Choudhury
Marlia Morsin	BEngg. in Comp. (UTM) (2003), MEngg. in Electrical (UiTM) (2004)	Transistor organik	Prof. Dr. Muhamad Mat Salleh & Prof. Madya Dr. Akrajas Ali Umar
Vivi Fauzia	BSc. in Physics (ITB) (1995), MSc. in Physics (ITB) (1997)	Fabrikasi sel surya organik berasaskan bahan P3HT/PCBM	Prof. Dr. Muhamad Mat Salleh & Prof. Madya Dr. Akrajas Ali Umar
Siti Salwa Zainal Abidin	Sm.Sains in Nuclear (UKM) (2002), Sarjana Sains in Nuclear (UKM) (2006)	Fabrikasi sel suria organik berasaskan bahan bio-organik	Prof. Dr. Muhamad Mat Salleh & Prof. Madya Dr. Akrajas Ali Umar
Athar Ali Shah		Plasmonic organic solar cell	Prof. Dr. Muhamad Mat Salleh & Prof. Madya Dr. Akrajas Ali Umar
Airul Azha Abdul Rahman	Sm.Kej. in Electrical, Electronics & Systems (UKM) (1994), Sarjana Sains in Electrical, Electronics & Systems (UKM) (2000)	Nanostructures organic/ composite materials for thermoelectric	Prof. Madya Dr. Akrajas Ali Umar & Prof. Dr. Muhamad Mat Salleh
Tengku Hasnan Tengku Abdul Aziz	Sm.Sains in Physics (UKM), SarjanaSains in Physics (UKM)	BioLED	Prof. Dr. Muhamad Mat Salleh & Dr. Akrajas Ali Umar
Norhayati Abu Bakar	Sm.Sains in Physics (UKM), Sarjana Sains in Microengineering and Nanoelectronics (UKM)	Penderiaan infra merah gas organik mengunakan hibrida nanopartikel perak dan bahan biologi	Prof. Dr. Muhamad Mat Salleh & Prof. Madya Dr. Akrajas Ali Umar

Student Name		Title of Thesis	Supervisor
Fuaida Harun	BSc. in Electrical Engg. (GWU) (1990), M.Engg. in Electrical Engg. (UTM) (1997),	Experimental study towards establishing suitable gold wire wedge pull (2nd bond) failure modes for leadframe packages	Prof. Madya Dr. Azman Jalar
Mohd Nubli Zulkifli	B.Engg. in Electronics Engg. (USM) (2005) MSc. in Microelectronics (UniMAP) (2008)	Nanoindentation approach in evaluation of wire bonding interconnection	Prof. Madya Dr. Azman Jalar
Wan Yusmawati Wan Yusoff	Bsc. (UPM)(2001), MSc. in Applied Optics (UPM) (2005)	kebolehtahanan bahan pen-yambungan pakej mikroelek-tronik terhadap keadaan radiasi	Prof. Madya Dr. Azman Jalar
Hazian Mamat	BEngg. in Electrical & Electronics (UiTM) (1999), MEngg. in Micro-electronics (UNIMAP) (2007)	Kebolehtahanan pakej penderia pH	Prof. Madya Dr. Azman Jalar
Izhan Abdullah		Pencirian wafer 4H-SiC terhadap diod schottky dalam pengesan radiasi	Prof. Madya Dr. Azman Jalar
Nur Azida Che Lah		Pengoksidaan suhu tinggi struktur terkimpal AA6061	Prof. Madya Dr. Azman Jalar
Mohd Hafiz Jumal		Interconnection of nano solder alloy for nanopackaging	Prof. Madya Dr. Azman Jalar
Yazan Samir Kasim		VLSI implementation of high speed fast fourier transform using digital slicing architecture	Assoc. Prof. Dr. Shabiul Islam
Mohammad Shaharia Bhuyan	BSc.in Computer Science and Engineering (AUST)(2002) MEngSc. in Microelectronics (Multimedia)(2009)	A novel design of MEMS based energy harvester processor for electric vehicle application	Assoc. Prof. Dr. Shabiul Islam

Masters Students

Student Name		Title of Thesis	Supervisor
Nor Azrina Dzulkefli	B.Eng in Electronics (Surrey) (2005)	Microvalve for drug delivery system	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Hafzaliza Erny Binti Zainal Abidin	BSc. in Physics (UPM) (2007)	Microenergy conversion and storing unit for powering bio-medical implants	Dr. Azrul Azlan Hamzah
Roer Eka Pawinanto	S.Pd. in Electrical Engg. (UPI) (2011)	Design and fabrication of electro magnetic actuator	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Nor Illiani Ramzi	Sm.Kej. in Microelectronics (UKM) (2007)	Microprobe for wafer testing application	Prof. Dato' Dr. Burhanuddin Yeop Majlis
Zalhan Binti Md Yusof		Polarization state characteristic in optical fibre	Prof. Dr. Sahbudin Shaari
Mohd Norzaliman Bin Mohd Zain	Sm. Sains in Physics (UKM) (1996)	Free space polarization encoded Quantum Key Distribution with decoy state	Prof. Dr. Sahbudin Shaari
Farahiyah Binti Ali	B.Engg. in Electrical & Electronics (UNITEN) (2011)	Pt (II) complex and dye entrapped core-shell silica nanoparticles layer	Prof. Dr. Sahbudin Shaari
Mohd Shahrul Akram Mohd Mokhtar	Sm. Kej. in Comm. & Computer (UKM)	Diod pemancar cahaya menggunakan hibrida bintik kuantum dan organik	Prof. Dr. Muhamad Mat Salleh & Assoc. Prof. Dr. Akrajas Ali Umar
Suratun Nafisah	BSc. in Physics (Riau)	Plasmonic organic hybride solar cell	Assoc. Prof. Dr. Akrajas Ali Umar & Prof. Dr. Muhamad Mat Salleh
Siti Khatijah Md Saad		Nitrogen dop TiO2 solar cell	Assoc. Prof. Dr. Mohd Yusri Abd Rahman & Prof. Dr. Muhamad Mat Salleh

Student Name		Title of Thesis	Supervisor
Mohd Zahrin Abdul Wahab		Micro structural study on interconnects reliability of triple metal CMOS technology	Assoc. Prof. Dr. Azman Jalar
Fakhrozi Che Ani		Kajian Ke Atas Sifat Bahan Dan Bendalir / Struktur Interaksi Campuran Metalurgi & Pemasangan Tanpa Plumbum Dalam Proses Aliran Semula Ketuhar	Assoc. Prof. Dr. Azman Jalar
Syed Roslee Sayd Bakar		A Study Of welded AA6061 aluminium alloy properties	Assoc. Prof. Dr. Azman Jalar
Foo Siew Peng		Antara sambungan nano aloi pateri-nano zarah untuk pempakejan nano	Assoc. Prof. Dr. Azman Jalar
Mohd Moesli Bin Muhammad		Proses pengendapan abu terbang menggunakan teknik plasma	Assoc. Prof. Dr. Azman Jalar
Mahidur Rahman Sarker	BSc. in Comp. Sci & Engg. (Southeast) (2006)	Design a low voltage energy harvesting SoC system for ultra-low-power bio-medical applications	Assoc. Prof. Dr. Shabiul Islam

Profile Of

PRINCIPLE FELLOWS

Institute Of Microengineering & Nanotechnology

Profile Of Principles Fellows

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 elecronics 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 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. Choudhurym,

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,(UKM)

BSc. (UNRI), PhD. (UKM)

- Semiconductor nanocrystals
- Metallic nanoparticles
- Nanocrystal-organic hybrid synthesis for optoelectronic devices layout

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

BSc. , MSc. (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

RESEARCH THEMES

Institute Of Microengineering & Nanotechnology

Prof. Dato' Dr. Burhanuddin Yeop Majlis
J.M.N., Smieee,Fmsss
Group Leader MEMS & Nanolectronics

Profile of Theme Leader

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 chaiman 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 stared 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 con use a variety of methods. MEMS actuators provide the ability to manipulate physical parameters at the microscale, and can employ eletrostatic, 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 Micro fabrication. 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. 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

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

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

Professor Dr. Muhammad Mat Salleh
Group Leader Organic & Printed Electronics

Profile of Theme Leader

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

Organic electronics is a field related to the study the properties of organic or polymeric materials utilized in active parts of electronic and opto-electronic devices. The subject also includes plastic electronics, bioelectronics, conducting polymer, organic semiconductors and nonlinear optical materials. Among the devices that can be fabricated using science and technology organic electronics are bio(chemical) sensors, pyroelectric sensors, solar cells, transistors and organic light emitting diodes (OLED). Research in this field at the Universiti Kebangsaan Malaysia (UKM) has begun since 1987. Until now, IMEN group has successfully fabricated a few devices prototype as such carbon monoxide gas sensor, optical electronic nose and OLED. Several sensor systems are being developed to test the potential of materials as sensor element. Because of the extremely wide scope of field of sensors, sensor manufacturing here will mainly focus on the use of sensors in automotive systems. Sensors related to safety and environmental control is also targeted.

The group focuses their research onto applications of organic thin films in electronic devices majoring in four areas namely OLED fabrication, sensor fabrication, quantum dot devices and the latest which is printed electronics. The group has collaborations with several universities in Indonesia such as Lembaga Ilmu Pengetahuan Indonesia (LIPI) and Gadjah Mada University. Indonesia in developing organic thin film devices.

Members of MEMS and Nanoelectronics research group:

Prof. Dr. Muhamad Mat Salleh

BSc. (ITB), Drs (ITB), PhD. (London), MIEEE, FMSSS

Research interests:

- Preparation and characterization of thin films for organic electronic devices, odor and gas sensors.
- Organic light emitting diodes (OLED)
- Electrochromic windows
- Solar cells
- Langmuir-Blodgett films

Contact: mms@ukm.my

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: mms@ukm.my

Professor Dr. Sahbudin Shaari
Group Leader Photonics & Nanophotonics

Profile of Theme Leader

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 reaserch 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
- Microlectronic devices
- Optoelectronic devices

The laboratory is a research entity under the main umbrella of Microelectronicswith 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 modulations

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

Prof. Dr. Azman Jalar
Group Leader Microelectronics Packaging & Materials

Profile of Theme Leader

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 Metallurgyand 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-perfomance-Relationship of materials
- Electornics Materials
- Materialography and stereometry
- Nanomaterials

The history for advanced semiconductor packaging research group started since year 2003 and was led by Assoc. Prof. Ibrahim Ahmad. The first project was Under Bump Metallurgy (UBM) which was the first collaboration between UKM and On Semiconductor Sdn. Bhd. It was funded by MOSTI with a grant value of more than RM 200,000. In 2004, research groups for semiconductor packaging in Malaysia have received an enormous research grant under RM-8 which is 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.

Research Projects

- Materials Characterisation
- IC Packaging
- Substrate and Bonding Technology
- Failure Analysis
- Package Reliability

Members of MIPAC research group :

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

Contact: azmn@ukm.my

Professor Dr. Masuri Othman
Group Leader Micro and Nanoelectronic Systems

Profile of Theme Leader

Masuri Othman received his BSc from UKM (1978), MSc from University of Essex, UK (1980) and PhD from Universityof 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

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 :

Prof. Dr. Sahbudin Shaari

BSc. (UKM), MSc. (Essex), PhD. (Wales), MIEEE, MMSSS

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

MBE Technology and III-V Compound Semiconductor

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.

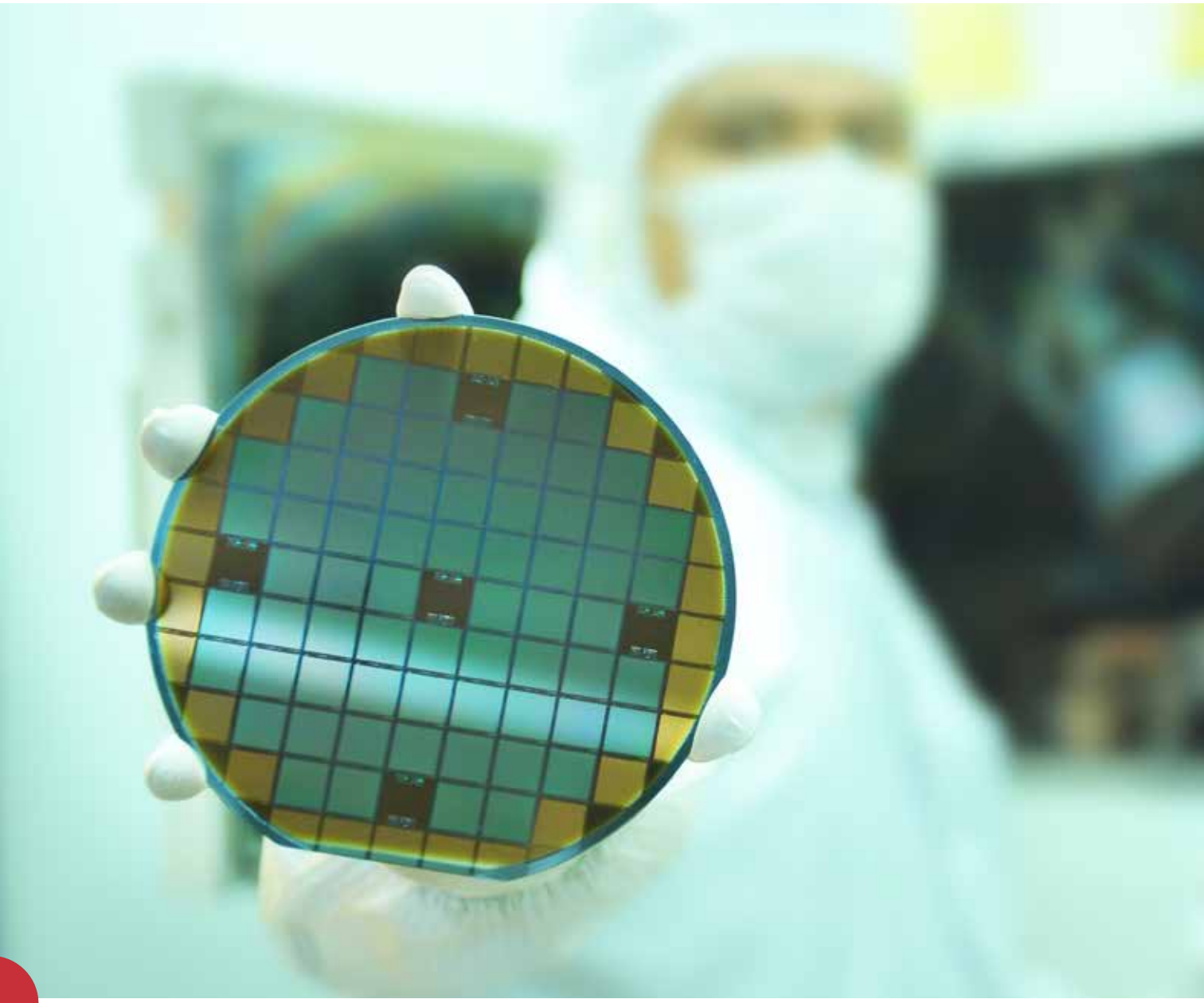
Research Projects

- 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
Email : razman@tmrnd.com.my

Mr. Nurul Afzan bin Omar,
Telekom R & D Sdn. Bhd
Email : afzan@tmrnd.com.my



RESEARCH GRANTS

Institute Of Microengineering & Nanotechnology

Research Grants 2012

Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
Lab on chip for medical applications (micro total analysis system)	UKM-AP-NBT-10-2009	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	1,152,200	3	384,077
MEMS and Nanoelectronics	OUP-IMEN-2012	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	40,000	1	40,000
MEMS and Nanoelectronics	OUP-2012-117	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	50,000	1	50,000
High sensitivity and small size MEMS capacitive microphone	INOVASI -2011-022	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	100,000	1	100,000
Nanoelektronik dan MEMS sensor	DIP-2012-16	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	443,000	2	221,500
Bantuan kewangan bahan penyelidikan	BKBP-FKAB-K003153	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Internal	35,200	1	352,00
Biomimetic development of a new generation of MEMS in medicine	UKM-AP-NBT-16-2010	Prof. Dr. Ille Gebeshuber	Internal	300,000	3	100,000
Bantuan kewangan bahan penyelidikan	BKBP-IMEN-K017745	Prof. Dr. Ille Gebeshuber	Internal	6,400	1	6,400
Dana Lonjakan Penerbitan	UKM-DLP-2012-026	Assoc. Prof. Dr. Dee Chang Fu	Internal	100,000	1	100,000
Bantuan kewangan bahan penyelidikan	BKBP-IMEN-K013525	Assoc. Prof. Dr. Dee Chang Fu	Internal	3,200	1	3,200

Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
Fabrication of a nanowire field effect transistor for hydrogen gas sensing application	BKBP-IMEN-K013525	Assoc. Prof. Dr. Dee Chang Fu	Internal	30,000	1	30,000
Bantuan kewangan bahan penyelidikan	UKM-GUP-2011-378	Assoc. Prof. Dr. Dee Chang Fu	Internal	6,200	1	6,200
Modelling of Dynamic Behaviour of Electrostatically Actuated MEMS microstructure	BKBP-FKAB-K007877	Dr. Badariah Bais	Internal	35,000	2	17,500
Development of MEMS electromagnetic micro pump for biomedical implants	UKM-GGPM-NBT-084-2010	Dr. Badariah Bais	Internal	30,000	2	15,000
Development of MEMS actuator using magnetic micro-coil	UKM-GUP-2011-379	Assoc. Prof. Dr. Jumril Yunas	Internal	20,000	2	10,000
Dana Lonjakan Penerbitan	UKM-GGPM-NBT-087-2010	Assoc. Prof. Dr. Jumril Yunas	Internal	100,000	1	100,000
MEMS microgenerator and storing unit for powering biomedical implants	UKM-DLP-2012-026	Prof. Dr. Pankaj Kumar	Internal	30,000	2	15,000
Nanofilter silikon untuk penulenan air bagi kitaran semula di kawasan sumber air terhad	UKM-GUP-2011-380	Assoc. Prof. Dr. Azrul Azlan Hamzah	Internal	20,000	2	10,000
Bantuan kewangan bahan penyelidikan	UKM-GGPM-NBT-083-2010	Assoc. Prof. Dr. Azrul Azlan Hamzah	Internal	3,000	1	3,000
Development of lab-on chip for peripheral blood stem cell isolation and rapid detection of tropical diseases from blood	BKBP-imen-K014762	Assoc. Prof. Dr. Azrul Azlan Hamzah	MOSTI	498,200	3	166,077
Synthesis and characterization of Indium Doped ZnO nanowires for Gas Sensing Application	NND/ND/(1)/TD11-002	Prof. Dato' Dr. Burhanuddin Yeop Majlis		39200	2	19,600
Synthesization and Characterization of Glucose-sensitive hydrogel	UKM-RRR1-07-FRGS0025-2010	Assoc. Prof. Dr. Dee Chang Fu		68,800	2	34,400

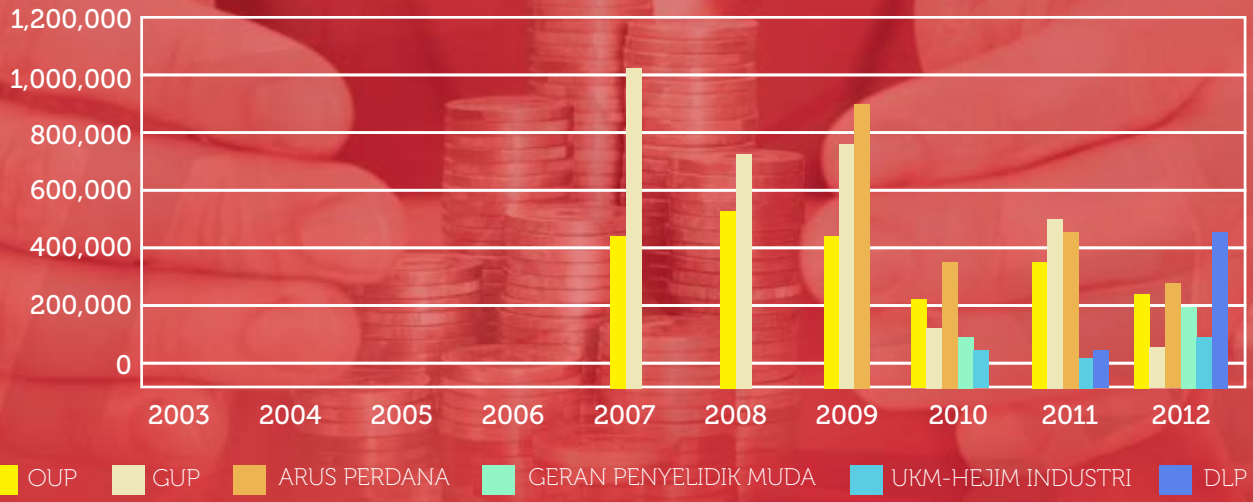
Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
Development of integrated electromagnetic micro-pump based on embedded planar micro-coil for ultra low fluid injection of bio-samples	03-01-02-SF0841	Assoc. Prof. Dr. Jumril Yunas		125,000	2	62,500
Development of high temperature resistant silicon carbide based mems pressure sensor for monitoring gas turbine performance	03-01-02-SF0849	Assoc. Prof. Dr. Azrul Azlan		235,000	2	117,500
Bantuan Kewangan Bahan Penyelidikan	BKBP-IMEN-K001065	Prof. Dr. Muhamad Mat Salleh	Bantuan Kewangan Bahan Penyelidikan	19,000	4 m	19,000
Dana Operasi Universiti Penyelidikan	OUP-2012-119	Prof. Dr. Muhamad Mat Salleh	Dana Operasi Universiti Penyelidikan	50,000	1	50,000
MEMS and Nano Sensors for Biosensing Applications	UKM-AP-2011-16	Prof. Dr. Muhamad Mat Salleh	Projek Arus Perdana	100,000	2	100,000
Light Emitting Device based on New Bio Polymer Material	UKM-GUP-2011-376	Prof. Dr. Muhamad Mat Salleh	Geran Universiti Penyelidikan (GUP)	30,000	1	30,000
Fabrikasi Peranti Luminesens Menggunakan Teknik Cetakan Injet	UKM-GUP-BTT-07-26-178	Prof. Dr. Muhamad Mat Salleh	Geran Universiti Penyelidikan (GUP)	458,526	5	100,000
Bahan Mampan & Teknologi Hijau Untuk Peranti Berkaitan Tenaga	AP-2012-025	Prof. Dr. Muhamad Mat Salleh	Projek Arus Perdana	100,000	2	50,000
Fabrikasi Peranti Hibrid Bintik Kuantum-Organik	UKM-GUP-NBT-08-25-086	Assoc. Prof. Dr. Akrajas Ali Umar	Geran Universiti Penyelidikan (GUP)	347,000	4	86,750
Bantuan Kewangan Bahan Penyelidikan	BKBP-IMEN-K017241	Assoc. Prof. Dr. Akrajas Ali Umar	Bantuan Kewagan Bahan Penyelidikan	3,000	4 m	3,000

Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
Investigation of Localized Plasmonic Effect on The Light Energy Conversion Efficiency of Quantum Dots Organics Hybrid Photovoltage	UKM-GUP-2011-377	Assoc. Prof. Dr. Akrajas Ali Umar	Geran Universiti Penyelidikan (GUP)	30000	1	30,000
NANOELEKTRONIK DAN MEMS SENSOR	DIP-2012-16	Prof. Dato' Dr. Burhanuddin Yeop Majlis	Dana Impak Perdana	443000	2	221,500
Green Organic Solar Cells based on Water Soluble Polythiophene and Nanocrystalline Zinc Oxide Prepared by Injket Printing Technique	03-01-02-SF0836	Prof. Dr. Muhamad Mat Salleh	Sciencefund	179800	2	93,500
Surface -Enhanced Raman Scattering Effect of Triangular Gold Nanoframes as Ultra Sensitive Sensor to Detect Bisphenol A	ERGS/1/2012/ STG02/ UKM/01/1	Prof. Dr. Muhamad Mat Salleh	Eksploratori	95000	2	47,500
Enhancing the Efficiency of Quantum Dots-organics Hybrids Photovoltaic Device by Plasmonic Effect of Silver Nanocrystals	FRGS/1/2012/ SG02/ UKM/02/3	Assoc. Prof. Dr. Akrajas Ali Umar	Fundamental	133200	2	66,600
Fabrication, Performance and Stability Studies of a Dye-Sensitized Solar Cell of ITO/ZnO/PEMA-LiBF4/ graphite	09-109 RG/ REN/AS_C-UNESCO	Assoc. Prof. Dr. Mohd Yusri Abdul Rahman	Antarabangsa	RM32000	2	16,000
Investigation of the complex propagation characteristics of optical waveguides	UKM-DLP-2011-023	Prof. Dr. Pankaj Kumar Choudhury	Universiti	100,000	1.5	66,667
Study and Characterization of Two-Dimensional time-Wavelength OCDMA System	UKM-GGPM-NBT-090-2010	Dr. P. Susthitha Menon	Universiti	25,000	2.5	10,000
Development of Nanophotonics Sensing Technology Using Nanomaterial-Coated Waveguide	UKM-AP-2011-15	Prof. Dr. Sahbudin Shaari	Universiti	100,000	2	50,000
Development of Optical Nanowires with laser source for medical and biology applications	UKM-GUP-NBT-08-25-085	Prof. Dr. Sahbudin Shaari	Universiti	270,000	4	67,500

Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
Free Carrier Dispersion Effect in a Novel SOI Active Microring Optical Modulator	GUP-2012-012	Dr. P. Susthitha Menon	Universiti	30,000	1	30,000
	OUP-2012-018	Prof. Dr. Sahbudin Shaari	Universiti	51,000	1	51,000
BANTUAN KEWANGAN BAHAN PENYELIDIKAN: Sahbudin Shaari	BKBP-FK-AB-K002977	Prof. Dr. Sahbudin Shaari	Universiti	28,000	1	28,800
BANTUAN KEWANGAN BAHAN PENYELIDIKAN: P Susthitha Menon	BKBP-IMEN-K017739	Dr. P. Susthitha Menon	Universiti	9,400	1	9,400
Investigation of the Transmission Characteristics of Microstructured Optical Fibers with Speciality Designed Twists	FRGS/1/2011/TK/UKM/01/16	Prof. Dr. Pankaj Kumar Choudhury	FRGS/KPT	98000	2	49,000
Broadband Source Generation utilisng four Wave Mixing phenom-enon throgh the application of Photonic Crystal fibre	FRGS/1/2011/TK/UKM/01/17	Prof. Dr. Sahbudin Shaari	FRGS/KPT	162,000	3	54,000
Surface Plasmonic Effect in A Nanomaterial-coated Tapered Silica-based Optical Microfiber	ERGS/1/2012/STG02/UKM/02/2	Dr. P. Susthitha Menon	ERGS/KPT	91,000	2	45,500
Design a Low Voltage Energy SoC System for Ultra-Low-Power Bio-medical Applications	UKM-GGPM-NBT-031-2011	Assoc. Prof. Dr. Shabiul Islam	GGPM	25,000	1	25,000
MEMS Based Energy Harvester Device for Low Power Gadget	UKM-GUP-2011-381	Assoc. Prof. Dr. Shabiul Islam	GUP	30,000	1	30,000
A new method to combine topology generation and circuit sizing for Analog Integrated Circuit Design	UKM-GUP-2012-037	Dr. Sawal Hamid Md Ali	GUP	30,000	1	30,000

Project	Project Code	Project Leader	Type Of Grant	Amount (RM)	Research Period (Y)	Allocation Per Year (RM)
A novel Algorithm to Combine Analytical Model with Genetic AlgorithmBased Optimization for Analog Integrated Circuit Design	UKM-GGPM-NBT-031-20110	Dr. Sawal Hamid Md Ali	GGPM	30,000	2	30,000
A System on Chip (SoC) Design of High Performance Direct Digital Frequency Synthesizer	UKM-GUP-2011-066	Dr. Sawal Hamid Md Ali	GUP	30,000	1	30,000
Novel ultra-low power circuit for ubiquitous devices	UKM-RRR1-02-FRGS0208-2010	Assoc. Prof. Dr. Shabiul Islam	FRGS	19,200	2	19,200
	OUP-2012-120	Assoc. Prof. Dr. Azman Jalar	Dana Operasi Universiti Penyelidikan	50,000.00	1	50,000.00
Antara Sambungan Nano Aloi Pateri-Substrat Untuk Pempakejan Nano	AP-2012-016	Assoc. Prof. Dr. Azman Jalar	Projek Arus Perdana	160,000.00	2	80,000.00

INTERNAL FUNDING 2003-2012



Research Highlights

Magnetic Microparticle Separation in Lab on a Chip System for Biomolecule Detection Applications

Microfluidic systems have become increasingly well-known in different fields of studies. In recent years, research and development on lab-on-a-chip (LOC) and micro total analysis systems(μ-TAS)havebeenrapidlygrowing. Microfluidic devices are becoming one of the most dynamic parts of BioMEMS technology. The main applications of microfluidics are medical diagnostics, genetic sequencing, chemistry, drug delivery, and proteomics. Bioseparation techniques that are widely used in biotechnology become more difficult as the quantity of the materials to be purified are very small, especially, in biological cell separation from suspensions with high fragility and aggregation possibilities. The use of magnetic field for separation of small magnetic particles is a well-known technique in biology. The magnetic fields can manipulate biological cells tagged by magnetic particles that are suspended inside the microfluidic system. One of the most importantstrengthofthistechniqueisthatit provides probably the most convenient and rapid method in separating desired particles from diluted solutions because magnetic fields are transparent to the cells and leave them without any damage. In biology, separation of specific target protein from a biological sample is very important in order to detect small amounts of antigens and biomolecules. For this purpose magnetic micro-particles have been used to separate and manipulate biomolecules. In this method magnetic beads are attached to target cells using specific ligands.

This work describes a microfluidic device that can separate magnetic particles from suspended liquid by activating a planar microcoil in order to generate magnetic force on micro magnetic particles. Injection of magnetic beads and ferrofluids through the inlet channel transfers them to the main chamber in which magnetic field is applied.

The magnetic field generated by the planar spiral coil instead of using permanent magnet yields several advantages in design flexibility and compactness. The fabrication of the microelectromagnet coil is based on a microscale winding process combined with nickel electroplating as a magnetic core to enhance the forces on magnetic particles at separation chamber. Two thin layers of polydimethylsiloxane (PDMS) and SU-8 are used to decrease the distance between microcoil and microchannel. Electromagnetic and thermoelectric simulation is performed in order to calculate the magnetic field and temperature distribution in the system. The bead capturing behavior is demonstrated in the chamber using three types of magnetic particles with 200 nm, 750 nm and 2.8 μm diameters. The experimental results show optimum capturing efficiency with dc current of 1 A passing through the microcoil. At this current, maximum magnetic flux density of 0.022 Tesla is achieved in the fluid microchannel, and the magnetic microparticles in buffer solution moved toward the bottom of the fluidic chamber where the coil is located. The maximum magnetic flux density gradient of 110 (T/m) is obtained at the center of the microchamber. When the dc current is removed the particles release easily. The described microelectromagnetic part for the first time features the ability to separate from the microfluidic part in order to use in other fluidic designs.

DISPOSABLE MICROFLUIDIC DEVICE FOR ISOLATION OF HUMAN WHITE BLOOD CELLS ON ELASTOMERIC SUBSTRATE ABSTRACT

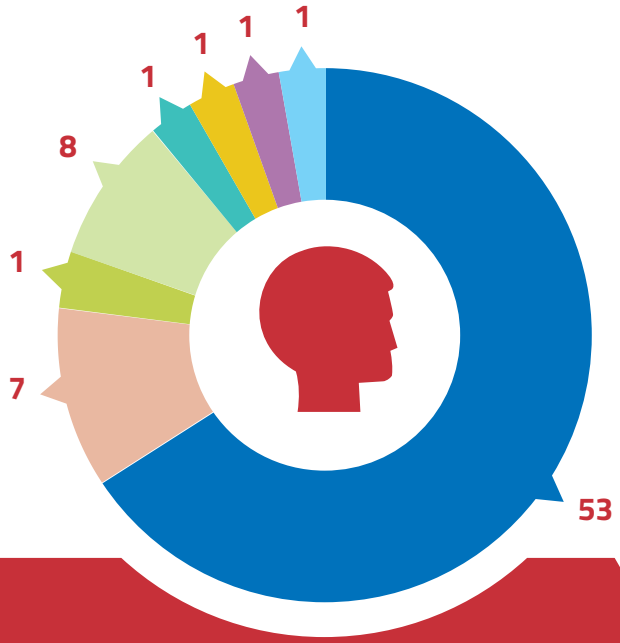
The field of microfluidic devices with biomedical applications is growing up very fast. This type of systems offers advantages over macro-scale devices in term of: low reagent and sample usage, short analysis time, high degree of automation/integration, and portability. There is a wide range of applications in biochemical, disease detection, and point-of-care analysis to name a few. The variety of physiochemical properties and low cost fabrication techniques has diverted the attentions of the researchers from silicon-based to polymeric substrates for microfluidic device fabrication. The isolation of white blood cells from other components of the human fresh blood is very important for assays such as genomic DNA extraction. The size-based mechanical filtration using regularly spaced micro-pores have high throughput separation capacity compared to others. A planar microfluidic device is designed for pillar-based separation of white cells from other components of the blood. Dimensions of the PUMA channels and the pillars are sized to withstand fluidic pressures. Numerical simulation of fluidic flows at different rates is performed for determining the pressure loss and efficient flow rates of separation. For rapid prototyping of the microfluidic device, a UV-curing elastomeric Polyurethane Methacrylate (PUMA) is introduced and characterized. Swelling and solubility of PUMA in different chemicals is determined. Time-dependent measurements of water contact angle shows that the native PUMA is hydrophilic without surface treatment. Current monitoring method is used for measurement of the electro-osmotic flow mobility in the microchannels made from PUMA. Optical, physical, thermal and mechanical properties of PUMA are evaluated. UV-lithography and molding process is used for making micropillars and deep channel microfluidic structures integrated to the supporting base layer. A device is fabricated and tested for examining strength of different bonding techniques such as conformal, corona treating and semi-curing of two PUMA layers in microfluidic application and the results show that the bonding strengths are comparable to PDMS. The 2-layer blood filtration device is fully made of elastomeric polyurethane methacrylate. Soft lithography is employed by casting PUMA using a PDMS mold replicated from deep reactive etched silicon master. The device was connected to the syringe pumps and fluorescent microspheres solution was injected at different flow rates. Images of introduced fluorescent microspheres are used for visualization of the separation phenomenon. The whole blood was introduced to the device and components of the blood that leave the filter were collected. Characterization of the device was performed for ruling out the efficiency and optimum separation throughput at various injection flow rates. Overall, the process time and efficiency of the employed techniques in separation show a substantial improvement compared to the traditional laboratory and other available microfluidic methods.

Abang Annuar Ehsan
Norhayati Abu Bakar
Shaharia Bhuyan
Nubli /Hafiz

FIGURES

Institute Of Microengineering & Nanotechnology

IMEN TOTAL STUDENTS

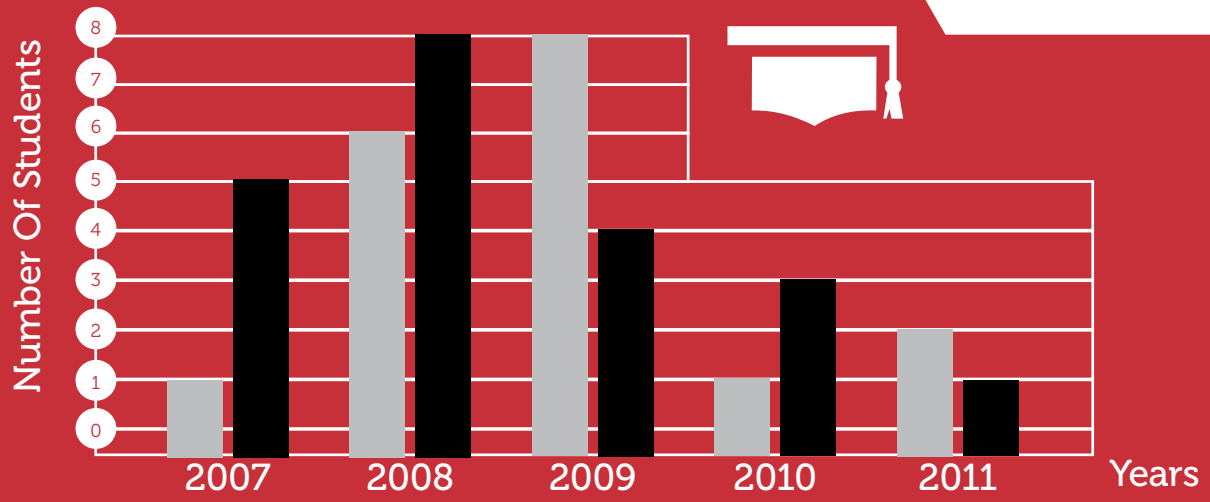


Colour Indicator

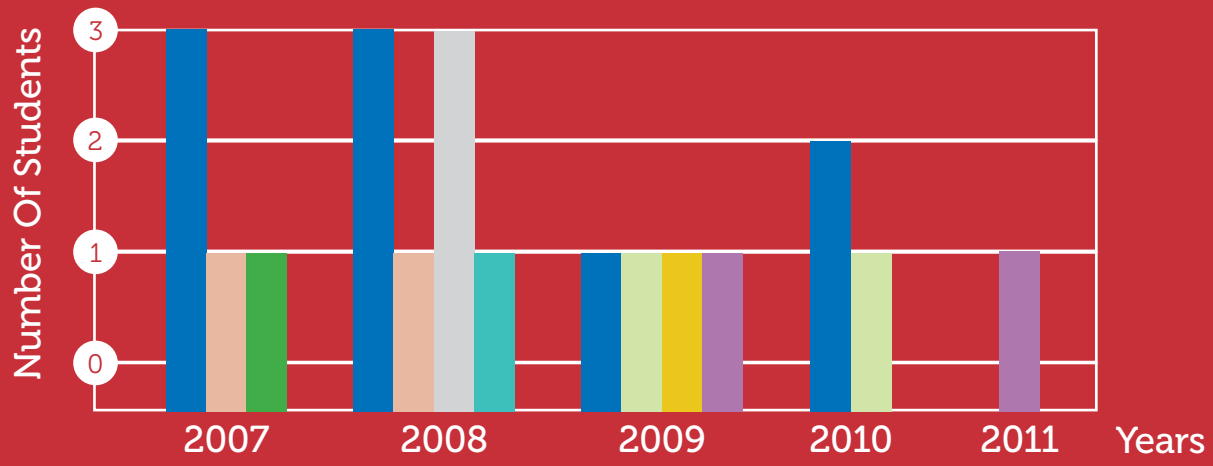
- Malaysia
- Indonesia
- Jordan
- Iran
- Libya
- Iraq
- UAE
- Bangladesh

- Master
- PhD

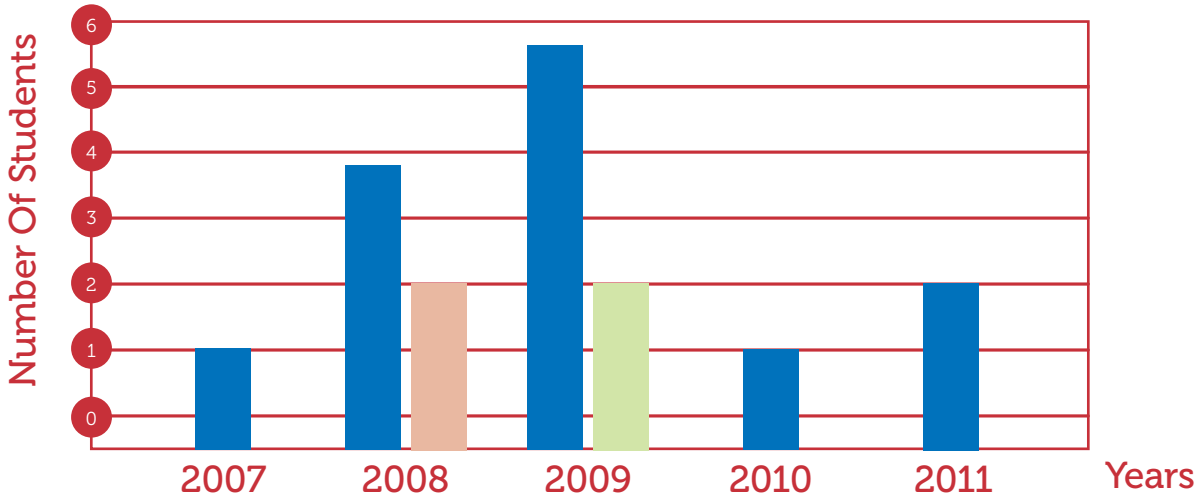
TOTAL IMEN GRADUATE STUDENTS



IMEN PhD STUDENTS 2007-2011



IMEN MASTER STUDENTS 2007-2011



EVENTS 2012

Institute Of Microengineering & Nanotechnology

Moving into IMEN new location

IMEN's administration office, OPEL lab and Micro and Nanosystems lab officially moved into Level 4 of the newly completed UKM Research Complex in February 2012. However, the MEMS microfabrication, MBE technology, photonics technology and MIPAC labs remain at their original locations in the Faculty of Engineering and Built Environment. In future all IMEN labs shall be moved into the new research complex.

2012 IEEE International Conference on Semiconductor Electronics (IEEE-ICSE2012)

IMEN together with Electron Devices Society of IEEE Malaysia Section organized the 10th IEEE International Conference on Semiconductor Electronics (IEEE-ICSE2012), from September 21-23 at the Grand Millennium Hotel Kuala Lumpur. The biannual conference was chaired by the Director of IMEN. Over 150 papers on topics related to micro and nanoelectronics, advanced materials and technology were presented.

The plenary speakers were:

Prof. Dr. Yoon Soon Fatt from Nanyang Technological University, Singapore on Thermal effects in InAs/GaAs quantum dot vertical cavity surface emitting lasers

Prof. Dr. Nico de Rooij from Swiss Federal Institute of Technology, Lausanne (EPFL) on Product innovation enabled by MEMS

Prof. Dr. Edward Yi Chang from National Chiao Tung University, Taiwan on InAs HEMT for terahertz applications

Prof. Dr. Ooi Boon Siew from KAUST, Saudi Arabia on Broadband semiconductor lasers and their applications

Prof. Dr. Akhlesh Lakhtakia from Pennsylvania State University, USAon Nanotechnology and metamaterials: Conceptualization and intersection for new opportunities

2012 IEEE International Conference on Semiconductor Electronics (IEEE-ICSE2012)


GRAND
MILLENNIUM


ICSE2012
ICSE
2012

The 6th Malaysia-Korea Joint Workshop on Nanotechnology and The 6th LIPI-IMEN Joint Seminar

The 6th Malaysia-Korea Joint Workshop on Nanotechnology and the 6th LIPI-IMEN Joint Seminar were held at the same venue with the conference. The 6th Malaysia-Korea Joint Workshop on Nanotechnology was held on 22 September 2013 while the 6th LIPI-IMEN Joint Seminar was held on the next day. Both workshops were dynamic with participants sharing their research activities and knowledge on their fields. The series of workshop shall be continued in 2013 at Korea and Indonesia respectively.

The 6th Malaysia-Korea Joint Workshop on Nanotechnology and The 6th LIPI-IMEN Joint Seminar


IMEN-LIPI

Syarahan Teknikal IMEN oleh Prof. Jakub Kedzierski of MIT, US


Gate Scaling Crisis (IV) - Solutions
Options: FDSOI, FinFET, trigate, gate-all-around, π-gate
In these architectures scaling length includes T_{si} which can be varied independently from the gate oxide thickness
Multiple gates help control short-channel effects

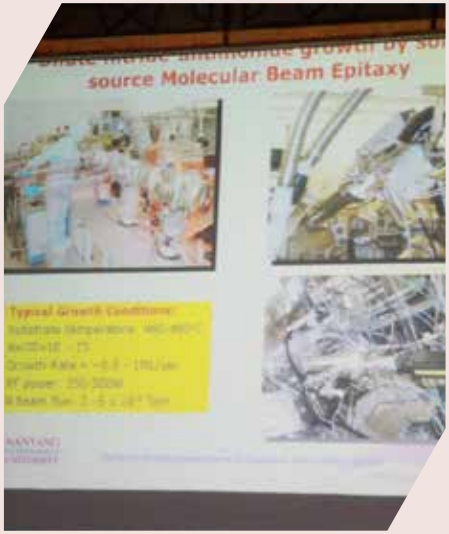
Majlis Sambutan Tahun Sains dan Gerakan Inovasi Nasional 2012 Peringkat UKM


NANOTE
AND ADVANC
Objectives


Roadmap


CIMB ISLAMIC
ABANG AMBIAR EHSAN
ENAM RIBU TIGA RATUS SAHAJA
RM 6,300.00

Public Lecture by Prof. Dr. Yoon Soon Fatt


source Molecular Beam Epitaxy

Kejohanan Fustal Empat Penjuru Piala Dato' Burhanuddin Yeop Majlis


KEJOHANAN
FUTSAL
EMPAT
12 Mei 2012


KEJOHANAN
FUTSAL


KEJOHANAN
FUTSAL
EMPAT PENJURU

FACILITIES

Institute Of Microengineering & Nanotechnology

1 Material Deposition

- LPCVD Oxidation Three stack Furnace (KoyoLab)
- Plasma Enhanced Chemical Vapour Deposition (PECVD)
- E-Beam Evaporation (Edwards Auto 306 Turbo)
- Metal evaporator (Med 0 I 0 Balzers)
- Sputter Coater (Baltec SCD-005)
- Oxidation Furnace
- DORF Sputtering System (NTI Nanofilm)

2 Etching

- ICP PlasmaLab System I 00 (Deep RIE)
- Electrochemical Etch System (MEMS Potentiostat SC)
- Plasma Enhanced Chemical Vapour Deposition (RIE)

3 Photolithography

- Karl-Suss MJB Mask Aligner (Karl Suss)
- Double Side Mask Aligner
- Ceramic Hotplate (Fischer Scientific)
- Coating Dispensing System-resist spinner (Spin Coater P6700)
- Resist Spin Coater (Mikasa SpinCoaster I H-D3)
- Thermolyne Hotplate (Thermolyne)
- Programmable Spin Coater
- DWL 66 Laser Write (Heidelberg DWL)

4 Simulation Softwares

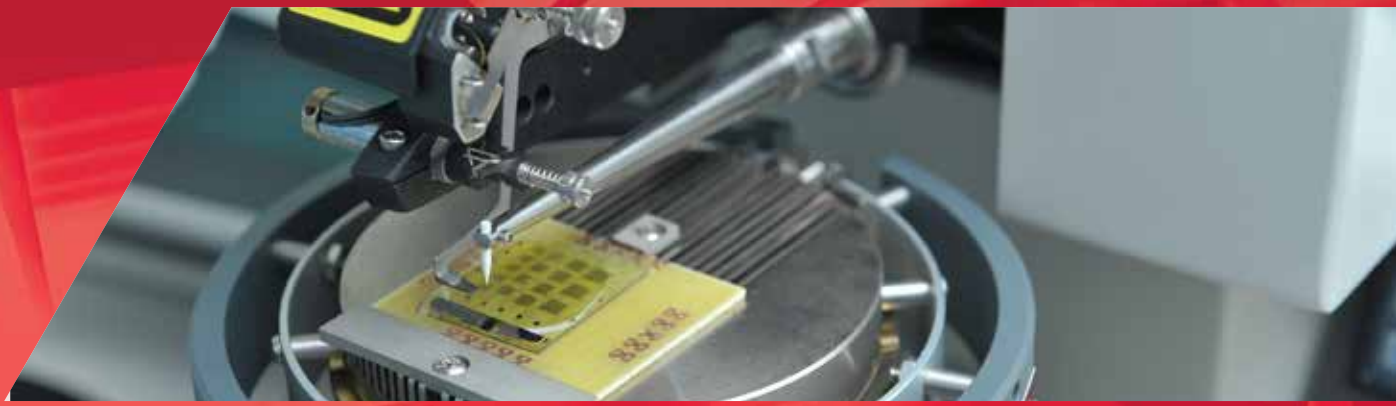
- Intellisuite : MEMS simulation
- Coventor: MEMS simulation

5 Characterization

- Fourier Transform Infrared (FTIR) (FTS 3000MX)
- Philips XL30 Scanning Electron Microscope (Philips XL 30 Series)
- VEECO surface profiler (WYKO NT I I 00)
- Leica Material Workstation (Leica DMLA)
  S.Thickness Mapping System (Filmetrics FS0-2000)
- DACTRON shaker
- Probe station (Micromanipulator)
- PZTTesting
- Ellipsometer (Melles Griot 05-LHP-321)
- SECA Microscope
- Oscilloscope, Le Croy
- TENCOR surface profiler
- Impedence Analyzer Agilent -HP4284 A
- Microfluidic Fruige Pump
- Fluorescene Microscope

6 Other Machines/ Facilities

- Wire bonding system (Kulicke & soffa 4500 Digital series)
- Wire Bonder
- Ultrasonic Cleaner (Brinson 1200)
- Ozone cleaner (UVO cleaner 144AX-220)
  S.Wafer scriber (Karl Suss)
- General purpose oven
- Dl water system
- Portable Liquid N2 tank
- Chemical freezer
- Wet station
- Eye wash station
- Fumehood I Wetbench



1 Deposition

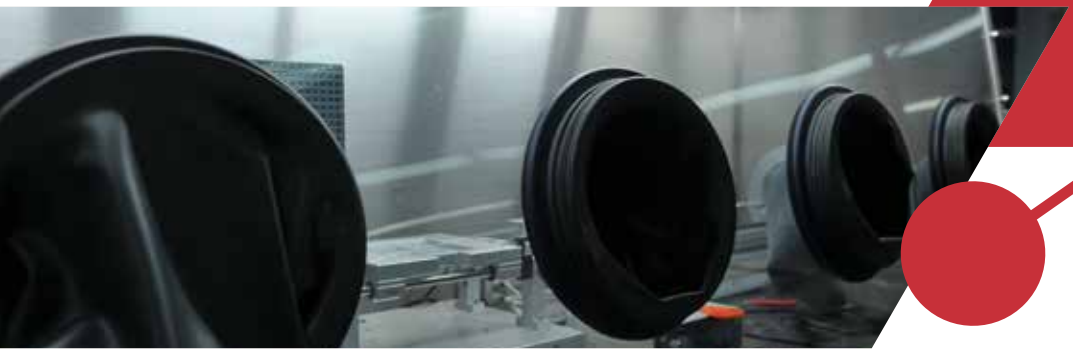
- E-GUN Evaporator
- Electron Beam Evaporator
- Dip Coater
- Spin Coater
- Langmuir- Blodgett

2 Characterization Equipment

- Photo Luminescence Spectrometer
- Fluorescent & Luminance Measurement
- Current -Voltage Measurement
- Color Measurement
- Elipsometer
- Scanning Probe Microscopy

3 Other Machines/ Facilities

- Acoustic Gas Sensor System
- Array Gas Sensor System
- Electrochromic Sensor System
- Humidity Sensor System
- Piezoelectric Pressure Sensor System
- Pyroelectric Thermal Sensor System
- Bolometer Sensor System
- Electric Sensor System
- Thermal Sensor System
- Glove Box System
- Helium HC70 Compressor Unit
- Tape Bonding



1 Optical Network

- FTTH testbed complete with ONUs and OLTs (24 users)
- CATV video system overlay on FTTH
- CWDM access network testbed
- OCDMA transmission network testbed

2 Film Deposition

- Oxidation/Diffusion Furnace
- Digital spin coaters, programmable hotplates
- UV curing and convection oven system

3 Optical Fiber Station

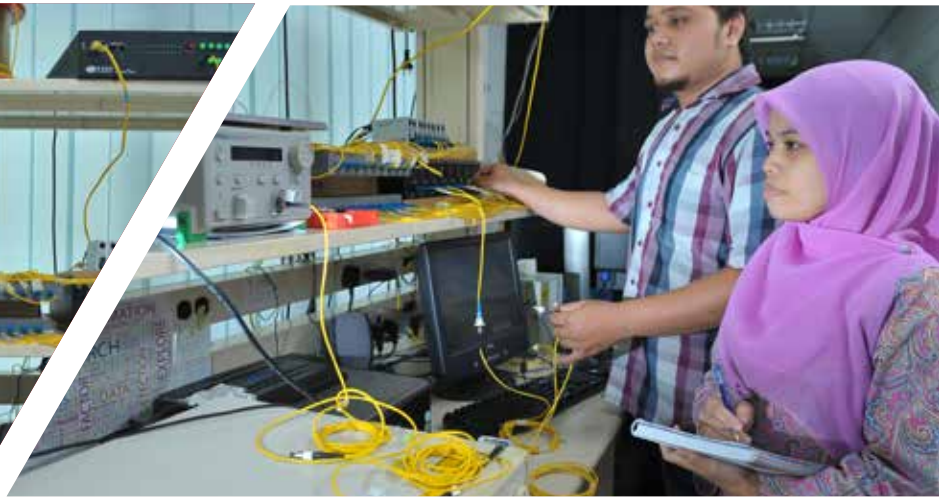
- Optical time domain reflectometers (OTDRs)
- Optical fused fiber coupler machine
- Optical fiber splices, cleavers, stripper, etc
- Fiber Optic testers

4 Design and Simulation Software

- OptiBPM for PLC devices (Optiwave Inc)
- OptiSystem for optical networks (Optiwave Inc)

5 Characterization,Text and Measurement

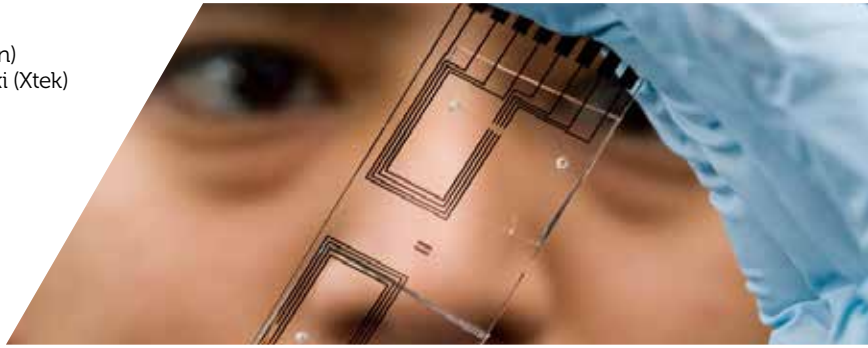
- Prism Coupler Station
- Fiber/Fiber array/Waveguide Alignment with viewing system
- Angle/controlled waveguide polisher
- Laser and broadband sources
- Optical power and energy meters
- Photodetectors
- Tunable laser sources (TLS)
- Optical Spectrum Analyzer (OSA) with channel selector
- Current sources with temperature controller
- Variable optical attenuator, polarizers and couplers
- Lock-in amplifiers
- High-speed oscilloscope
- RF spectrum analyzer
- Optical modulators
- Laser diodes for optical pumps



LABORATORY MICROELECTRONICS PACKAGING & MATERIALS

1 Equipments

- Universal Testing Machine 5564 (Instron)
- Dynamic Microtesting Machine 5848 (Instron)
- CT Scan X-Ray Imaging System Hmxct-160xi (Xtek)
- Infinite Focus Profilometer (Aiicona)
- Nano Indenter (MicroMaterials)
- Metallography Microsectioning (Buehler)
- Thermal Cycle Chamber (Tps)



2 Software

- Abaqus
- Ansy

LABORATORY MICRO AND NANOELECTRDNIC SYSTEMS

1 Characterization

- Logic Analyzer
- Oscilloscope
- Data Generator
- Function Generator

2 Board

- Vertex-2 FG456 Proto Board
- XC3s 400K
- DSP Development Board
- University Program UP2 Education board
- Altera FPGA Board

3 Software

- ISE 6.2 Xilinx Project Navigator
- Modelsim Xilinx 6 edition II (MXE-1 I) V5.7g
- Design Analyzer/ Design Compiler synthesis tool
- SPW signal Processing worksystem
- Assura Verification
- Virtuoso layout editor
- Spectre circuit simulation

1 Characterization

- Molecular Beam Epitaxy (MBE)
- Hall Effect System
- Surface Profiler
- ECV Profiler


4524A Dig
CAUTION: HOT SURFACE

PUBLICATION

Institute Of Microengineering & Nanotechnology

Articles in ISI WoS/SCOPUS Indexed journals

Aziz, F., Sulaiman, K., Karimov, K.S., Muhammad, M.R., Sayyad, M.H. & Majlis, B.Y. 2012. Investigation of optical and humidity-sensing properties of vanadyl phthalocyanine-derivative thin films. Molecular Crystals and Liquid Crystals 566(1): 22-32 (ISI, SCOPUS)

Hamzah, A.A., Abd Aziz, N., Yeop Majlis, B., Yunas, J., Dee, C.F. & Bais, B. 2012. Optimization of HNA etching parameters to produce high aspect ratio solid silicon microneedles. Journal of Micromechanics and Microengineering 22(9): art. no. 095017 (ISI, SCOPUS)

Yu, H.W., Chung, C.C., Wang, C.T., Nguyen, H.Q., Tran, B.T., Lin, K.L., Dee, C.F., Majlis, B.Y. & Chang, E.Y 2012. InGaP/GaAs dual-junction solar cell with AlGaAs/GaAs tunnel diode grown on 10° off misoriented GaAs substrate. Japanese Journal of Applied Physics 51(8): art. 080208 (ISI, SCOPUS)

Alvankarian, J. & Majlis, B.Y. 2012. A new UV-curing elastomeric substrate for rapid prototyping of microfluidic devices. Journal of Micromechanics and Microengineering 22(3): art. no. 035006 (ISI, SCOPUS)

Karamdel, J., Dee, C.F., Saw, K.G., Varghese, B., Sow, C.H., Ahmad, I. & Majlis, B.Y. 2012. Synthesis and characterization of well-aligned catalyst-free phosphorus-doped ZnO nanowires. Journal of Alloys and Compounds 512(1): 68-72 (ISI, SCOPUS)

Karamdel, J., Hadi, A., Dee, C.F. & Majlis, B.Y. 2012. Effects of substrate on surface morphology, crystallinity, and photoluminescence properties of sputtered ZnO nano films. Ionics 18 (1-2): 203-207 (ISI, SCOPUS)

Aziz, F., Hassan Sayyad, M., Sulaiman, K., Majlis, B.H., Karimov, K.S., Ahmad, Z. & Sugandi, G. 2012. Influence of humidity conditions on the capacitive and resistive response of an Al/VOPc/Pt co-planar humidity sensor. Measurement Science and Technology 23(1): art. no. 014001 (SCOPUS)

Hsiao, Y.-L., Lu, L.-C., Wu, C.-H., Chang, E.Y. , Kuo, C.-I., Ma, J.-S., Lin, K.-L., Luong, T.-T., Huang, W.-C., Chang, C.-H., Dee, C.F. & Majlis, B.Y. 2012. Effect of graded AlxGa1-xN layers on the properties of GaN grown on patterned Si substrates. Japanese Journal of Applied Physics 51(2): art.025505 (ISI, SCOPUS)

Karman, S.B. , Diah, S.Z.M. & Gebeshuber, I.C. 2012. Bio-inspired polarized skylight-based navigation sensors: A review. Sensors (Switzerland) 12(11): 14232-14261 (ISI, SCOPUS)

Keewah Chan, Boon Tong Goh, Saadah Abdul Rahman, Muhamad Rasat Muhamad, Chang Fu Dee & Zarina Aspanut. 2012. Annealing effect on the structural and optical properties of embedded Au nanoparticles in silicon suboxide films. Vacuum 86: 1367-1372 (ISI, SCOPUS)

Su Kong Chong, Boon Tong Goh, Yuen-Yee Wong, Hong-Quan Nguyen, Hien Do, Ishaq Ahmad, Zarina Aspanut, Muhamad Rasat Muhamad, Chang Fu Dee & Saadah Abdul Rahman. 2012. Structural and photoluminescence investigation on the hot-wire assisted plasma enhanced chemical vapor deposition growth silicon nanowires. Journal of Luminescence 132: 1345–1352 (ISI, SCOPUS)

Articles in ISI WoS/SCOPUS Indexed journals

Mohmad, A.R., Bastiman, F., Hunter, C.J., Richards, R., Sweeney, S.J., Ng, J.S. & David, J.P.R. 2012. Effects of rapid thermal annealing on GaAs1-xBix alloys. Applied Physics Letters 101(1): art. no. 012106 (ISI, SCOPUS)

Bastiman, F., Mohmad, A.R.B., Ng, J.S., David, J.P.R. & Sweeney, S.J. 2012. Non-stoichiometric GaAsBi/GaAs (100) molecular beam epitaxy growth. Journal of Crystal Growth 338(1): 57-61 (ISI, SCOPUS)

Hunter, C.J., Bastiman, F., Mohmad, A.R., Richards, R., Ng, J.S., Sweeney, S.J. & David, J.P.R. 2012. Absorption characteristics of GaAs1-xBix/GaAs diodes in the near-infrared. IEEE Photonics Technology Letters 24(23): 2191-2194 (ISI, SCOPUS)

Reeve, R.M., Chin, S.-L. , Kopper, K.-P., Ionescu, A. & Barnes, C.H.W. 2012. Experimental and theoretical study of electron-beam-induced spin-reorientation transition reversal in the CO/Co(110) system. Journal of Physics D: Applied Physics 45(27): art. no. 275003 (ISI, SCOPUS)

Dehzangi, A. , Larki, F., Hutagalung, S.D., Saion, E.B., Abdullah, A.M., Hamidon, M.N., Majlis, B.Y., Kakooei, S., Navaseri, M. & Kharazmi, A. 2012. Numerical investigation and comparison with experimental characterisation of side gate p-type junctionless silicon transistor in pinch-off state. Micro and Nano Letters 7(9): 981-985 (ISI, SCOPUS)

Ismardi, A., Dee, C.F., Hamzah, A.A., Bais, B., Salleh, M.M., Majlis, B.Y. & Gebeshuber, I.C. 2012. Co-synthesis and characterization of In2O3 and ZnO nanowires. Sains Malaysiana 41(4): 459-463 (ISI, SCOPUS)

Chong, S.K., Goh, B.T., Dee, C.F. & Rahman, S.A. 2012. Study on the role of filament temperature on growth of indium-catalyzed silicon nanowires by the hot-wire chemical vapor deposition technique. Materials Chemistry and Physics 135(2-3):635-643 (ISI, SCOPUS)

Nguyen, H.-Q., Chang, E.Y. , Yu, H.-W., Trinh, H.-D., Dee, C.-F., Wong, Y.-Y., Hsu, C.-H., Tran, B.-T. & Chung, C.-C. 2012. Threading dislocation blocking in metamorphic InGaAs/GaAs for growing high-quality In0.5Ga0.5As and In0.3Ga0.7As on GaAs substrate by using metal organic chemical vapor deposition. Applied Physics Express 5(5): art. no. 055503 (ISI, SCOPUS)

Yunas, J., Yeop Majlis, B., Hamzah, A.A. & Bais, B. 2012. Design, fabrication and testing of sandwich coupled inductors. Microsystem Technologies 18(6): 739-744 (SCOPUS)

Ahmad, I., Dee, C.F., Husnain, G., Rafique, H.M., Long, Y. & Naseem, S. 2012. Use of high-intensity electron beam to form nanohole, induce bending and fabricate nanocontact on a ZnO nanowire. Micro and Nano Letters 7(2): 122-124 (SCOPUS)

Husnain, G., Ahmad, I., Yao, S.-D., Rafique, H.M., Umar, A.A. & Dee, C.F. 2012. Depth-dependent tetragonal distortion study of AlGaN epilayer thin film using rbs and channeling technique. Modern Physics Letters B 26(14), art. no. 1250086 (ISI, SCOPUS)

Articles in ISI WoS/SCOPUS INDEXED PROCEEDINGS

Johari, J. & Majlis, B.Y. 2012. MEMS-based piezoelectric micropump for precise liquid handling. Proceedings of the 2012 International Conference on System Engineering and Technology, ICSET 2012 , art. no. 6339327 (SCOPUS)

Elgomati, H.A., Majlis, B.Y., Hamid, A.M.A., Susthitha, P.M. & Ahmad, I. 2012. Modelling of process parameters for 32nm PMOS transistor using Taguchi method. Proceedings - 6th Asia International Conference on Mathematical Modelling and Computer Simulation (AMS 2012), pp. 40-45 (SCOPUS)

Rahim, R.A., Bais, B., Majlis, B.Y. & Sugandi, G. 2012. An alternative polymeric protection mask for bulk KOH etching of silicon. Proc. DTIP 2012 - Symposium on Design, Test, Integration and Packaging of MEMS/MOEMS, pp. 204-207 (ISI, SCOPUS)

Sulaiman, N., Yunas, J., Sugandi, G. & Majlis, B.Y. 2012. Physical characteristic analysis of solenoid-based coil structure. Advanced Materials Research 403-408: 3739-3743 (ISI, SCOPUS)

Abrar, I., Chang, F.D., Gebeshuber, I.C. & Majlis, B.Y. 2012. Growth and characterization of indium doped ZnO nanowires using vapor transport deposition method. Advanced Materials Research 364: 202-205 (ISI, SCOPUS)

Gebeshuber, I.C. 2012. Green nanotribology. Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science 226(2): 347-358 (ISI, SCOPUS)

Tiong T.Y., Dee C.F., Salleh M.M., Yeop Majlis B. & Yahaya M. 2012. Butane sensing property of Si-ZnO nanowires p-n junction. Advanced Materials Research 364: 260-265 (ISI, SCOPUS)

Chang Fu Dee, Seong Ling Yap, Chi Chin Yap, Chiow San Wong & Burhanuddin Yeop Majlis. 2012. Study on the effect of Ar ion beam bombardment on ZnO nanowires. Proc. 2nd ASEAN - APCTP Workshop on Advanced Materials Science And Nanotechnology: (AMSN 2010), AIP Conf. Proc. 1455, pp. 235-241 (ISI)

Mohmad, A.R., Bastiman, F., Ng, J.S., Sweeney, S.J. & David, J.P.R. 2012. Room temperature photoluminescence intensity enhancement in GaAs1-xBix alloys. Physica Status Solidi (C) Current Topics in Solid State Physics 9(2): 259-261 (SCOPUS)

Elgomati, Husam Ahmed; Majlis, Burhanuddin Yeop & Ahmad, Ibrahim. 2012. Modeling and optimizing of threshold voltage of 32nm NMOS transistor using L18 orthogonal array Taguchi method. Proc. 2nd International Conference on Fundamental and Applied Sciences (ICFAS), AIP Conference Proceedings 1482: 543-549 (ISI)

Mohammadmahdi Vakilian, Maryam Mousavi, Badariah Bais & Burhanuddin Yeop Majlis. 2012. Optimization of cantilever-based MEMS switch. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 168-172. (SCOPUS)

Mardhiah Mohd Nor, Badariah Bais, Norazreen Abd Aziz, Rosminazuin Ab. Rahim & Burhanuddin Yeop Majlis. 2012. Induced mass change technique for glucose detection in microcantilever-based sensors. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 340-343. (SCOPUS)

Articles in ISI WoS/SCOPUS INDEXED PROCEEDINGS

Mohd Hazrul Zakaria, Badariah Bais, Rosminazuin Ab. Rahim & Burhanuddin Yeop Majlis. 2012. Geometrical characterization of single layer silicon based piezoresistive microcantilever using ANSYS. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 336-339 (SCOPUS)

Luay Yassin Taha, Burhanuddin Yeop Majlis & Ahmad Al Ali. 2012. Analysis of a MEMS piezoelectric microgenerator using network placement method. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 6-9. (SCOPUS)

Noraini Marsi, Burhanuddin Yeop Majlis, Azrul Azlan Hamzah & Faisal Mohd-Yasin. 2012. Comparison of mechanical deflection and maximum stress of 3C SiC- and Si-based pressure sensor diaphragms for extreme environment. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 186-190 (SCOPUS)

Ummikalsom Abidin, Burhanuddin Yeop Majlis & Jumril Yunas. 2012. Design and simulation of high magnetic gradient device for effective bioparticles trapping. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 195-199 (SCOPUS)

Marianah Masrie, Burhanuddin Yeop Majlis, Jumril Yunas & P Susthitha Menon. 2012. Design study of integrated optical transducer for bioparticles detection. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 205-209 (SCOPUS)

Norihan Abdul Hamid, Burhanuddin Yeop Majlis, Jumril Yunas & Mimiwaty Mohd Noor. 2012. The effect of isopropyl alcohol on anisotropic etched silicon for the fabrication of microheater chamber. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 210-213 (SCOPUS)

Alireza Bahadorimehr, Jafar Alvankarian & Burhanuddin Yeop Majlis. 2012. Magnetic force on a magnetic bead. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 280-284. (SCOPUS)

J. Karamdel, F. Razaghian, A. Hadi, C. F. Dee & B. Y. Majlis. 2012. Effects of annealing temperature on morphology and crystallinity of nitrogen doped zinc oxide (ZnO:N) nano films. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 302-305. (SCOPUS)

Tiong Teck Yaw, Abrar Ismardi, Dee Chang Fu & Burhanuddin Yeop Majlis. 2012. Studies on the growth of alumina nanoporous film and nanowires on planar & cylindrical substrate. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 306-310 (SCOPUS)

Jafar Alvankarian, Alireza Bahadorimehr, Benyamin Davaji & Burhanuddin Yeop Majlis. 2012. Issues and challenges in microfluidic research studies. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 333-335.(SCOPUS)

Hafzaliza Erny Zainal Abidin, Azrul Azlan Hamzah & Burhanuddin Yeop Majlis. 2012. Electrical characterization of interdigital electrode based on cyclic voltammetry performances. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 348-351. (SCOPUS)

MEMS & Nanoelectronics

Articles in ISI WoS/SCOPUS INDEXED PROCEEDINGS

Nadzril Sulaiman, Jumril Yunas & Burhanuddin Yeop Majlis. 2012. Effect of varying thickness of electroplated NiFe film on magnetic properties. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 357-359 (SCOPUS)

Mimiwaty Mohd Noor, Gandi Sugandi & Burhanuddin Yeop Majlis. 2012. Micro-heater Filament on polyimide membrane for gas sensor applications. Proc. IEEE International Conference on Semiconductor Electronics (ICSE2012), pp. 360-362 (SCOPUS)

PHOTONICS TECHNOLOGY AND NANOPHOTONICS

Articles in ISI WoS/SCOPUS Indexed Journals

P.S. Menon, S. Kalthom Tasirin, Ibrahim Ahmad and S. Fazlili Abdullah. 2012. Optimization of process parameters for Si lateral PIN photodiode. World Applied Sciences Journal 20:98-103 (SCOPUS)

Isaac A. M. Ashour, Sahbudin Shaari, P Susthitha Menon & Hesham A. Bakarman. 2012. Optical code-division multiple-access and wavelength division multiplexing: hybrid scheme review. Journal of Computer Science 8(10):1718-1729 (Scopus)

Abdullah, H., Saadah, N. & Shaari, S. 2012. Effect of deposition time on ZnS thin films properties by chemical bath deposition (CBD) techinique. World Applied Sciences Journal 19(8): 1087-1091 (Scopus)

Ashour, I.A.M.; Shaari, S.; Menon, P.S. & Bakarman, H.A. 2012. Optical code-division multiple-access and wavelength division multiplexing: hybrid scheme review. Journal of Computer Science 8(10):1718-1729 (Scopus)

Wan Maisarah Mukhtar, Sahbudin Shaari, P. Susthitha Menon & Abang Annuar Ehsan. 2012. Analysis of biconical taper geometries to the transmission losses in optical microfibers. Optoelectronics and Advanced Materials-Rapid Communications 6(11-12):988-992 (ISI & SCOPUS)

P. S. Menon, B. Bais, Aimi Azri Mohd Jhi & S. Shaari. 2012. Optical crosstalk in interdigitated lateral PIN photodiodes. Optoelectronics and Advanced Materials-Rapid Communications 6(5-6):535-538 (ISI & SCOPUS)

P. S. Menon, K. Kandiah, J. S. Mandeep, S. Shaari & P. R. Apte. 2012. Near field and far field effects in the optimized design of an InP/GaAs-based double wafer-fused MQW long-wavelength vertical-cavity surface-emitting laser. Journal of Nonlinear Optical Physics & Materials 21(1): art. no. 1250004 (ISI & SCOPUS)

P Susthitha Menon, Ali Z. Ghazi Zahid, JS Mandeep, and S. Shaari . 2012. Realization of 2-D OCDMA network using EDW code. Optik-International Journal for Light and Electron Optics 123(15):1385-1389 (ISI & SCOPUS)

Abdul Khir, M.F., Mohd Zain, M.M., Bahari, I., Suryadi & Shaari, S. 2012. Implementation of two way quantum key distribution protocol with decoy state. Optics Communications 285(5): 842-845 (ISI & SCOPUS)

Articles in ISI WoS/SCOPUS Indexed Journals

Ehsan, A.A., Shaari, S. & Rahman, M.K.A. 2012. Acrylic-based asymmetric and variable coupling ratio y-branch plastic optical fiber coupler. Optical Review 19(1):13-19 (ISI & SCOPUS)

Ehsan, A.A., Shaari, S. & Rahman, M.K.A. 2012. Machining of acrylic-based Y-branch plastic optical fiber coupler with suspended waveguide taper. Optical Review 19(1):7-12 (ISI & SCOPUS)

Khir, Mohd Fared bin Abdul, Zain, Mohd Norzaliman Mohd, Soekardjo, Suryadi, Saharudin, Suhairi & Shaari, Sahbudin. 2012. Implementation of two-way free space quantum key distribution. Optical Engineering 51(4): 045006 (ISI & SCOPUS)

M. A. Baqir & P. K. Choudhury. 2012. On the energy flux through a uniaxial chiral metamaterial made circular waveguide under PMC boundary. Journal of Electromagnetic Waves and Applications 26(16):2165-2175 (ISI & SCOPUS)

P. K. Choudhury . 2012. Transmission through twisted clad liquid crystal optical fibers. Progress in Electromagnetics Research 131:169-184 (ISI & SCOPUS)

P. K. Choudhury. 2012. Dispersion behavior of gold-nanocoated dielectric optical fibers. Advances in Materials Science and Engineering 2012: art. ID 214614 (ISI & SCOPUS)

Articles in ISI WoS/SCOPUS Indexed Proceedings

Hesham A. Bakarman, Tawfig Eltaif, P. S. Menon & Isaac A. M. A. 2012. Simulation of MQC code for optical CDMA PON system. Proc. 2012 IEEE International Conference on Photonics, pp. 42-45 (Scopus)

Ismail, Khadijah; Menon, P. Susthitha; Bakarman, Hesham A.; Bakar, Ahmad Ashrif A & Arsad, Norhana. 2012. Performance of 18 channel CWDM system with inline SOA. Proc. 2012 IEEE International Conference on Photonics, pp. 215-219 (Scopus)

Zahid, Ali Z. Ghazi; Mandeep, J S; Menon, P Susthitha; Bakarman, Hesham; Hasoon, Feras N.; Bakar, Ahmad Ashrif A & Ali, Mohd. Alauddin Mohd. 2012. Performance analysis of multi-weighted 2D-OCDMA TEDW. Proc. 2012 IEEE International Conference on Photonics, pp. 204-209 (Scopus)

Khir, M.F.A., Bahari, I., Zain, M.N.M. & Ehsan, A.A. 2012. Erroneous signal detection and secure distance improvement in two way quantum key distribution protocol with decoy state. The3rd International Conference on Photonics 2012, Proceedings, art. no. 637986 , pp. 390-394 (Scopus)

F.Salehuddin, I.Ahmad, F.A.Hamid, A.Zaharim, Afifah Maheran A.Hamid, P.Susthitha Menon, H.A.Elgomati, B.Yeop Majlis & P.R.Apte. 2012. Optimization of process parameter variation in 45nm p-channel MOSFET using L18 orthogonal array. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 219-223 (Scopus)

Articles in ISI WoS/SCOPUS Indexed Proceedings

P.Susthitha Menon, S.Kalthom Tasirin, Ibrahim Ahmad & S.Fazlili Abdullah. 2012. High performance of a SOI-based lateral PIN photodiode using SiGe/Si multilayer quantum well. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 403-406 (Scopus)

Hazura H., Menon, P.S, Burhanuddin Yeop Majlis, Hanim A.R, Mardiana B., Hasanah, L., Mulyanti, B., Mahmudin, D. & Wiranto, G. 2012. Modeling of SOI-based MRR by coupled mode theory using lateral coupling configuration. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 422-425 (Scopus)

Afifah Maheran A.H., Menon, P.S., I. Ahmad, H.A. Elgomati, B.Y. Majlis & F. Salehuddin. 2012. Scaling down the 32 nm gate length NMOS transistor to 22 nm. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 173-176 (Scopus)

I.A.M.; Shaari, S.; Menon, P.S.; Bakarman, H.A. & Shalaby, H.M.H. 2012. Hybrid wavelength-division multiplexing/optical code-division multiple-access system based on hybrid. Proc. 2012 International Conference on Advances in Materials Science and Engineering (Scopus)

Ashour, I.A.M., Shaari, S., Shalaby, H.M.H. & Susthitha Menon, P. 2012. Performace and confidentiality comparison of different hybrid SAC/OCDMA-WDM overlay schemes. Proc. Progress in Electromagnetics Research Symposium, pp. 1594-1599 (Scopus)

Ehsan, A.A., Shaari, S. & Abd Rahman, M.K. 2012. Asymmetric Y-branch plastic optical fiber coupler. Progress in Electromagnetics Research Symposium, pp. 1029-1032 (Scopus/ISI)

Rashid, A.R.A., Menon, P.S. & Shaari, S. 2012. Structural and optical properties of nanostructured Zn1-xMnxO thin films. Advanced Materials Research 378-379: 731-734 (Scopus/ISI)

Mukhtar, W.M., Menon, P.S. & Shaari, S. 2012. Study of Fraunhofer diffraction pattern from a circular aperture using an optical fiber microprobe. Advanced Materials Research 378-379: 565-568 (Scopus/ISI)

Hazura, H., Hanim, A.R., Mardiana, B., Menon, P.S., Shaari, S. & Majlis, B.Y. 2012. Performance of optical wavelength demultiplexer based on silicon-on-insulator (SOI) microring resonators (MRRs). Advanced Materials Research 378-379: 549-552 (Scopus/ISI)

Mardiana, B., Hanim, A.R., Hazura, H., Shaari, S., Menon, P.S., Abdullah, H. & Arsad, N. 2012. 2x2 optical switch based on silicon-on-insulator microring resonator. Advanced Materials Research 378-379: 531-534 (Scopus/ISI)

Rashid, A.R.A., Menon, P.S., Arsad, N., & Shaari, S. 2012. Ultraviolet sensing by al-doped ZnO thin films. Advanced Materials Research 364: 154-158 (Scopus/ISI)

Hazura, H., Hanim, A.R., Mardiana, B., Shaari, S. & Menon, P.S. 2012. Process modeling, optimization and characterization of silicon <100> optical waveguides by anisotropic wet etching. Advanced Materials Research 403-408: 4295-4299(Scopus/ISI)

Mardiana, B., Hanim, A.R., Hazura, H., Shaari, S., Menon, P.S., Abdullah, H. 2012. Plasma dispersion effect for various doping configuration on the SOI phase modulator with trapezoidal rib waveguide. Advanced Materials Research 403-408: 4403-4407 (Scopus/ISI)

Articles in ISI WoS/SCOPUS Indexed Proceedings

Rashid, A.R.A., Menon, P.S. & Shaari, S. 2012. Influence of doping concentrations of sol gel derived Zn1-xMnxO thin films. Advanced Materials Research 403-408: 753-757 (Scopus/ISI)

Mardiana, B., Hanim, A.R., Hazura, H., Shaari, S., Menon, P.S. & Abdullah, H. 2012. Active SOI optical ring resonator based on free carrier injection. Advanced Materials Research 403-408: 758-761 (Scopus/ISI)

W. M. Mukhtar, P.Susthitha Menon & S. Shaari. 2012. Effect of taper angle of the optical fiber microprobe in power collection. Advanced Materials Research 403-408: 3387-3391 (Scopus/ISI)

W. M. Mukhtar, P.Susthitha Menon & S. Shaari. 2012. Microfabricated fiber probe by combination of electric arc discharge and chemical etching techniques. Advanced Materials Research 462: 38-41 (Scopus/ISI)

Mardiana, B., Hanim, A.R., Hazura, H., Shaari, S., Menon, P.S. & Abdullah, H. 2012. Performance of the active microring resonator based on SOI rib waveguide. Advanced Materials Research 462: 375-379 (Scopus/ISI)

Razak, H.A., Haroon, H., Bidin, M., Shaari, S. & Menon, P.S. 2012. Analysis of silicon-on-insulator (SOI) buried waveguide phase modulator. Advanced Materials Research 462: 532-535 (Scopus/ISI)

Razak, H.A., Haroon, H., Bidin, M., Menon, P.S. & Shaari, S. 2012. Free carrier absorption loss of optical phase modulator. Advanced Materials Research 545: 355-358 (Scopus/ISI)

Nizam A, M., Arsad, N., Hanim, A.R., Shaari, S, Annuar E, A, Nasir, ZA, M. & Rashid ZA, A.M 2012. Effect of attenuation on four-wave mixing generation. Advanced Materials Research 378-379: 748-751 (Scopus/ISI)

Ehsan, A.A. & Rahman, M.K.A. 2012. Acrylic-based 1x2 plastic optical fiber coupler device manufacturing using EGX400 desktop engraver system. Advanced Materials Research 383-390: 7155-7160 (Scopus)

Ehsan, A.A. & Abd Rahman, M.K. 2012. Metal-based asymmetric hollow waveguide and Y-branch plastic optical fiber couplers. Proc. 2012 Symposium on Photonics and Optoelectronics (SOPO 2012) , art. no. 6271017 (Scopus)

P. K. Choudhury & W. K. Soon. 2012. Liquid crystal tapered optical fibers would be more efficient to obtain evanescent field. Proc. 2012 the 9th International Conference on Electrical Engineering/ Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2012) , art. no. 6254139 (Scopus)

M. A. Baqir & P. K. Choudhury. 2012. Guided modes in perfect magnetic conductor bounded uniaxial chiral metamaterial fiber. Proc. 2012 IEEE Asia-Pacific Conference on Applied Electromagnetics, APACE 2012, pp. 243-246 (Scopus)

M. A. Baqir & P. K. Choudhury. 2012. On the waves in circular waveguides containing chiral nihility metamaterial under PMC boundary. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 392-395 (Scopus)

Eltaif, T.; Bakarman, H.A.; Menon, P.S.; Ashour, I.a.M. & Shaari, S. 2012. Analysis of simple successive interference cancellation scheme in optical CDMA spectral amplitude coding. Proc. 2012 International Conference on Advances in Materials Science and Engineering (Scopus)

Articles in ISI WoS/SCOPUS Indexed Journals

Rahman, M.Y.A., Umar, A.A., Roza, L. & Salleh, M.M. 2012. Effect of TiO2 nanostructure morphology on the performance of a photoelectrochemical cell of ITO/TiO2/electrolyte/ platinum. Journal of Solid State Electrochemistry 16(12): 3947-3952 (ISI WoS)

Jumali, M.H.H., Al-Asbahi, B.A., Yap, C.C., Salleh, M.M., Alsalhi, M.S. 2012. Optoelectronic property enhancement of conjugated polymer in poly(9,9â€²-di-n-octylfluorenyl-2.7-diyl)/titania nanocomposites. Thin Solid Films 524: 257-262 (ISI WoS)

Umar, A.A., Rahman, M.Y.A., Taslim, R., Salleh, M.M. & Oyama, M. 2012. Effect of the thickness of quasi one-dimensional zinc oxide nanorods synthesized via multiple growth process under ammonia assisted hydrolysis technique on the performance of dye-sensitized solar cell. International Journal of Electrochemical Science 7(9): 8384-8393 (ISI WoS/ Scopus)

Teh, C.H., Mat Salleh, M., Mohamed Tahir, M.I., Daik, R. & Kassim, M.B. 2012. 1,4-Dibromo-2,5-dibutoxybenzene. Acta Crystallographica Section E: Structure Reports Online 68 (9): 02683 (ISIWoS)

Tahir, S.F.B.M., Ramli, N., Izzuddin, I., Salleh, M.M., Yahaya, M., Umar, A.A. & Jumali, M.H.H. 2012. Effect of ZnO addition on structural properties of ZnO-PANi/carbon black thin films. Sains Malaysiana 41(8): 1001-1004 (ISI WoS)

Nengsih, S., Umar, A.A., Salleh, M.M. & Oyama, M. 2012.Detection of formaldehyde in water: A shape-effect on the plasmonic sensing properties of the gold nanoparticles. Sensors (Switzerland) 12(8): 10309-10325 (ISI WoS)

Umar, A.A., Rahman, M.Y.A., Taslim, R. & Salleh, M.M. 2012. Dye-sensitized solar cell utilizing quasi one-dimensional of highly compact vertical array ZnO nanorod. International Journal of Electrochemical Science 7(8): 7253-7260 (ISI WoS/ Scopus)

Umar, A.A., Iwantono, I., Abdullah, A., Salleh, M.M. & Oyama, M. 2012. Gold nanonetwork film on the ito surface exhibiting one-dimensional optical properties. Nanoscale Research Letters 7: 1-19 (ISI WoS / Scopus)

Umar, A.A., Oyama, M., Salleh, M.M. & Majlis, B.Y. 2012. Silver nanocombs and branched nanowires formation in aqueous binary surfactants solution. Journal of Nanoparticle Research 14(7): art. no. 1001 (ISI WoS/ Scopus)

Teh, C.H., Mat Salleh, M., Mohamed Tahir, M.I., Daik, R. & Kassim, M.B. 2012. 2,2â€²-[2,5-Bis(hexyloxy)-1,4-phenylene] dithiophene. Acta Crystallographica Section E: Structure Reports Online 68 (7): 01976 (ISI WoS)

Husnain, G., Ahmad, I., Yao, S.-D., Rafique, H.M., Umar, A.A. & Dee, C.F. 2012. Depth-dependent tetragonal distortion study of AlGaN epilayer thin film using rbs and channeling technique. Modern Physics Letters B 26(14):Art 1250086 (ISI WoS)

Fui, M.L.W., Hang, N.K., Minggu, L.J., Umar, A.A. & Kassim, M.B. 2012. Determination of band energy levels for tungsten nitrosyldithiolene. Sains Malaysiana 41(4):439-444 (ISI WoS / Scopus)

Umar, A.A., Reshak, A.H., Oyama, M. & Plucinski, K.J. 2012. Fluorescent and nonlinear optical features of CdTe quantum dots. Journal of Materials Science: Materials in Electronics 23:546-550 (ISI WoS/ Scopus)

Articles in ISI WoS/SCOPUS Indexed Journals

Akrajas Ali Umar, Mohd Yusri Abd Rahman, Siti Khatijah Md Saad & Muhamad Mat Salleh. 2012. Effect of NH3 concentration on the performance of nitrogen doped TiO2 photoelectrochemical cell. International Journal of Electrochemical Science 7(9):7855-7865 (ISI WoS/ Scopus)

V. Fauzia, A.A. Umar, M.M. Salleh & M. Yahaya. 2012. Thermal annealing effect on the morphology of inkjet printed polymer: fullerene composites solar cells. Acta Physica Polonica A 121:155-158 (ISI WoS)

Articles in ISI WoS/SCOPUS Indexed Proceedings

Tan, S.T., Umar, A.A., Yahaya, M., Yap, C.C. & Salleh, M.M. 2012. Effect of ZnO nanoseed structure on the growth orientation of vertical array ZnO nanorods via hydrothermal process. Applied Mechanics and Materials 229-231: 239-242 (Scopus)

Sidik, N.F.W.M., Zamzuri, M.Z.M., Mat Salleh, M. & Ismail, K.A. 2012. Effect of NaVO3 concentration on corrosion resistance of conversion coating on AZ91D magnesium alloy. Advanced Materials Research 576: 438-441 (Scopus)

Yap, C.C., Bakar, A.A., Yahaya, M. & Salleh, M.M. 2012. Growth of ZnO nanostructures at different reactant concentrations for inverted organic solar cell. Advanced Materials Research 545: 71-75 (Scopus)

Zain, M.Z.M., Illias, S., Mat Salleh, M., Ismail, K.A. & Nooraizedfiza, Z. 2012. Improvement of corrosion resistance of rare earth element (REE)-based anodic oxidation coating on AZ91D magnesium alloy. Applied Mechanics and Materials 187: 210-214 (Scopus)

Mohamed, R., Salleh, M.M. & Yahaya, M. 2012. Development of a piezoelectric chemical sensor using metalloporphyrins compounds as a coating material. Proceedings - 2012 IEEE 8th International Colloquium on Signal Processing and Its Applications (CSPA 2012), pp. 41 – 43 (Scopus)

Syamin, N., Yap, C.C., Yahaya, M. & Salleh, M.M. 2012. Effect of electric field treatment on the performance of organic salt doped solar cell. Advanced Materials Research 501: 261-265 (Scopus)

Ginting, R.T., Yap, C.C., Yahaya, M. & Salleh, M.M. 2012. Effect of Eosin-Y coating temperature on the performance of invert bulk heterojunction organic solar cells. Advanced Materials Research 501: 199-203 (Scopus)

Lim, E.L., Yap, C.C., Yahaya, M. & Salleh, M.M. 2012. ZnO nanorod arrays coated with Eosin-Y at different concentrations for inverted bulk heterojunction organic solar cells. Advanced Materials Research 501: 199-203 (Scopus)

Jumali, M.H.H., Mohamad, S.M., Awang, R., Yahaya, M., Said, M.R.M. & Salleh, M.M. 2012. Effect of annealing temperatures on formation of Na0.5Bi 0.5TiO3 and (Na0.5Bi0.5) 0.96Ba 0.04TiO3 ceramics prepared via sol gel method. Advanced Materials Research 501: 76-80 (Scopus)

Mat Salleh, M., Hamidon, R., Zain, M.Z.M. & Khee, H.S. 2012. Design and anaysis of thermoacoustic air conditioning system as environmental friendly device. Advanced Materials Research 463-464: 932-935 (Scopus)

ORGANIC AND PRINTED ELECTRONICS

Articles in ISI WoS/SCOPUS Indexed Proceedings

Mohammad, H.H.J., Noor, J.R., Umar, A.A., Yahya, M. & Salleh, M.M. 2012. Characterization of SnO2 nanoparticles prepared by two different wet chemistry methods. Advanced Materials Research 364: 322-326 (Scopus)

Roza, L., Umar, A.A., Rahman, M.Y.A. & Salleh, M.M. 2012. Seed-mediated liquid phase deposition method for TiO2 nanostructure growth on ITO substrate: Effect of surfactant. Advanced Materials Research 364: 393-397 (Scopus)

Norhayati Abu bakar, Akrajas Ali Umar, Muhamad Mat Salleh, Muhammad Yahaya & Burhanuddin Yeop Majlis. 2012. Localized surface plasmon resonance sensor of gold nanoparticles for detection pesticides in water. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 344 - 347 (Scopus)

Marlia Morsin, Akrajas Ali Umar, Muhamad Mat Salleh, Muhammad Yahaya & Burhanuddin Yeop Majlis. 2012. High sensitivity localized surface plasmon resonance sensor of gold nanoparticles: surface density effect fo detection of boric acid. Proc. 2012 IEEE International Conference on Semiconductor Electronics, pp. 352 - 356 (Scopus)

Ruziana Mohamed; Muhamad Mat Salleh & Muhammad Yahaya. 2012. Development of a piezoelectric chemical sensor using metalloporphyrins compounds as a coating material. Proceedings - 2012 IEEE 8th International Colloquium on Signal Processing and Its Applications (CSPA 2012), pp. 41-43 (Scopus)

MICROELECTRONICS SEMICONDUCTOR PACKAGING

Articles in ISI WoS/SCOPUS Indexed Journals

Zulkifli, M.N., Abdullah, S., Othman, N.K. & Jalar, A. 2012Some thoughts on bondability and strength of gold wire bonding. Gold Bulletin 45(3): 115-125 (ISI/SCOPUS)

Hamid, M.A.A., Bakar, M.A., Jalar, A. & Shamsudin, R. 2012. Substrate dependence of the properties of MgO films produced using an aqueous chemical growth method. Current Nanoscience 8(1) : 50-54 (ISI/SCOPUS)

Bakar, S.R.S., Ahmad, M.Y., Ibrahim, M.F.A., Jalar, A., Djalil, S.J.S. & Othman, N.K. 2012. The effect of double pass GMAW process on microstructure and mechanical properties of AA 6061-T6 joining plates. Key Engineering Materials 510-511(1) : 98-104 (SCOPUS)

Abdullah, S., Yunoh, M.F.M., Jalar, A. & Nopiah, Z.M. 2012. Identification of index value for fatigue features using K-Means clustering approach. Advanced Science Letters 14(1): 468-470 (SCOPUS)

Zulkifli, M.N., Jalar, A., Abdullah, S. & Othman, N.K. 2012. Nanoindentation stereometry of wire bonding. Advanced Science Letters 13: 474-477 (SCOPUS)

Yunoh, M.F.M., Abdullah, S., Jalar, A., Abdullah, M.F. & Zulkifli, R. 2012. Structural durability of QFN package using three-point bending test. International Review of Mechanical Engineering 6(3): 528-536 (SCOPUS)

MICROELECTRONICS SEMICONDUCTOR PACKAGING

Articles in ISI WoS/SCOPUS Indexed Proceedings

Muzakkar, M.Z., Ahmad, S.H.J., Yarmo, A., Jalar, A. & Bijarimi, M. 2012. The effect of PE-g-MAH plus γ-GPS on shear strength of the aluminium/LLDPE/aluminium (APEA) laminate composite. Advanced Materials Research 576: 276-279 (SCOPUS)

Hasim, S.N.F., Hamid, M.A.A., Shamsudin, R., Radiman, S. & Jalar, A. 2012. Surface morphology of metal oxide SnO2 under different concentrations of oxygen by thermal evaporation method. Advanced Materials Research 501: 266-270 (SCOPUS)

Nurul Atikah, S., Othman, N.K. & Jalar, A. 2012. High temperature corrosion of Fe-30Cr in flowing CO2 gas. Advanced Materials Research 501: 165-168 (SCOPUS)

Amiruddin, A.M.H., Shamsudin, R., Jalar, A. & Hamid, M.A.A. 2012. Single layer brushite coating onto stainless steel substrate using dipcoating technique. Advanced Materials Research 399-401: 2004-2007 (SCOPUS)

Zulkifli, M.N., Jalar, A., Abdullah, S., Shamsudin, R. & Zulkifli, R. 2012. Hardness variation of ball bond wire bonding. Advanced Materials Research 399-401, pp. 1048-1051 (SCOPUS)

CheLah, N.A., Jalar, A. & Othman, N.K. 2012. Post-weld oxidation behavior of AA6061 Al alloy. Advanced Materials Research 399-401: 2087-2090 (SCOPUS)

Jalar, A., Yusoff, W.Y.W., Othman, N.K., Abdullah, S. & Rahman, I.A. 2012. Gamma irradiation effect on load-deflection curve of semiconductor package. Advanced Materials Research 399-401: 912-915 (SCOPUS)

Hamid, M.A.A., Bakar, M.A., Jalar, A., Shamsudin, R. & Ahmad, I. 2012. Morphology and optical properties of nickel oxide nanostructure from aqueous solution. Advanced Materials Research 399-401: 581-584 (SCOPUS)

MICROELECTRONICS SEMICONDUCTOR PACKAGING

Articles in ISI WoS/SCOPUS Indexed Journals

Mukter Zaman, Gunawan Witjaksono, Masuri Othman, Shabiul Islam & Nowshad Amin. 2012. Design of MEMS based energy harvester to profile environmental parameter using autonomous WSN components. Applied Mechanics and Materials 152-154: 1846-1851 (SCOPUS)

Md. Shabiul Islam, M. S. Bhuyan, Mahidur R. Sarker & Masuri Othman. 2012. Field programmable gate array (FPGA) realization of a fast 2-D discrete cosine transform algorithm for higher image compression. International Journal of the Physical Sciences 7(4): 519-526 (SCOPUS)

M. S. Bhuyan, Masuri Othman, Sawal Hamid Md Ali, Burhanuddin Yeop Majlis & Md. Shabiul Islam. 2012. Investigation on MEMS-based piezoelectric energy harvester design with aspect of autonomous sensors. Asian Journal of Scientific Research 6(1) : 1-15 (SCOPUS)

Articles in ISI WoS/SCOPUS Indexed Journals

Mohd Faizul Idros, Sawal Hamid Ali & Shabiul Islam. 2012. Design of Intelligent SoC Controller for Engine Oil Sensing and Monitoring System. Asian Journal of Scientific Research 5(3): 70-77 (SCOPUS)

Articles in ISI WoS/SCOPUS Indexed Proceedings

Mukter Zaman, Gunawan Witjaksono, Teh Aun Shih, Shabiul Islam, Masuri Othman & Nowshad Amin. 2012. The effect on physical, electrical and structural parameters of RF sputtered molybdenum thin film. Advanced Materials Research 403-408: 5092-5096 (SCOPUS)

Algnabi, Y.S., Aldaamee, F.A., Teymourzadeh, R., Othman, M. & Islam, M.S. 2012. Novel architecture of pipeline Radix 22 SDF FFT based on digit-slicing technique. Proc. 2012 IEEE International Conference on Semiconductor Electronics (ICSE 2012), pp. 470-474 (Scopus)

Bhuyan, M.S., Othman, M., Ali, S.H.M., Majlis, B.Y. & Islam, M.S. Modeling and simulation of fluid interactions with bluff body for energy harvesting application. Proc. 2012 IEEE International Conference on Semiconductor Electronics (ICSE 2012), pp. 123-127 (Scopus)

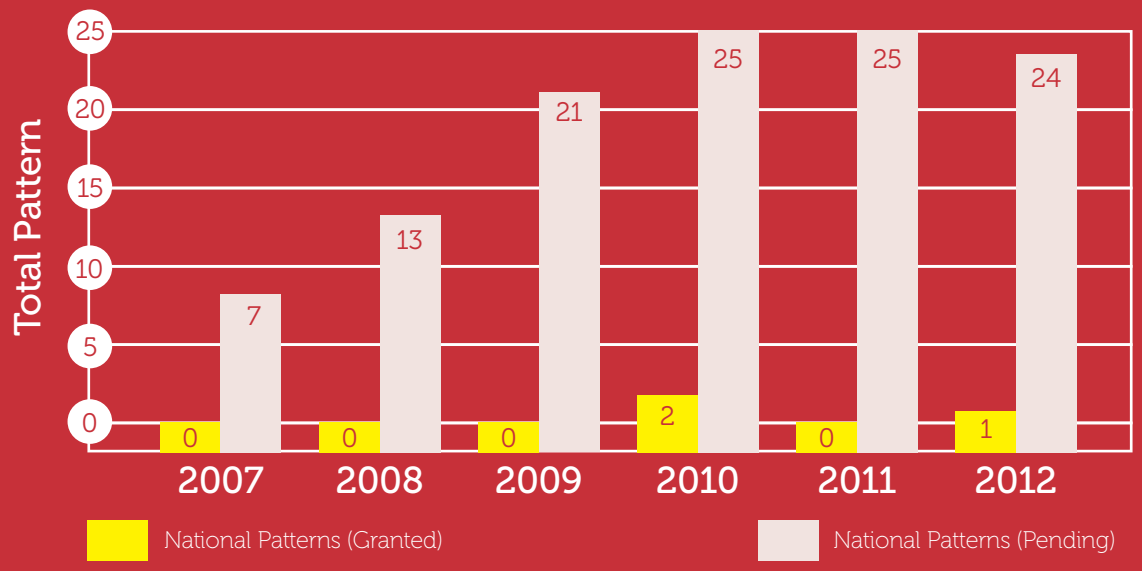
Ibrahim, S.H., Ali, S.H.M. & Islam, M.S. 2012. High speed direct digital frequency synthesizer with pipelining phase accumulator based on Brent-Kung adder. Proc. 2012 IEEE International Conference on Semiconductor Electronics (ICSE 2012), pp. 547-550 (Scopus)

Ibrahim, S.H., Ali, S.H.M. & Islam, M.S. 2012. Design a 24-bits pipeline phase accumulator for direct digital frequency synthesizer. Proceedings - 2012 International Symposium on Instrumentation and Measurement, Sensor Network and Automation (IMSNA 2012), pp. 393-397 (Scopus)

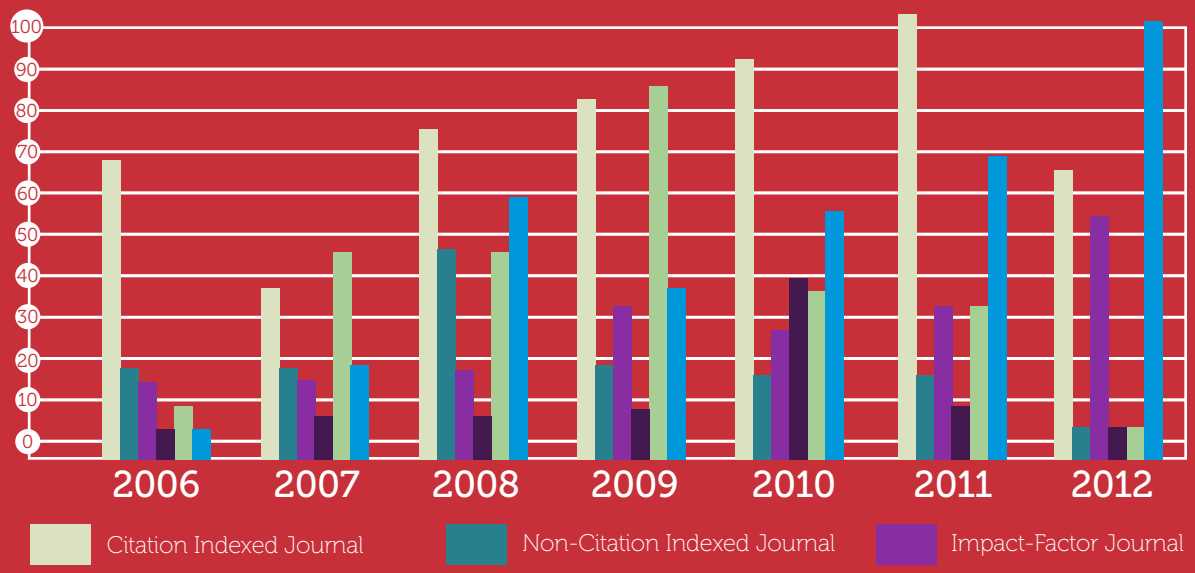
Idros, M.F.M., Ali, S. & Islam, M.S. 2012. Optical analysis for condition based monitoring of oxidation degradation in lubricant oil. Proceedings of 2012 4th International Conference on Intelligent and Advanced Systems: A Conference of World Engineering, Science and Technology Congress (ESTCON), pp. 735-740 (Scopus)

Idros, M.F.M., Ali, S. & Islam, Md.S. 2012. Quantitative analysis of spectroscopy's study for engine oil degradation monitoring due to temperature effect. Proceedings - 3rd International Conference on Intelligent Systems Modelling and Simulation (ISMS 2012), pp. 278-282 (Scopus)

Pattern Pending and Granted 2007-2011



Publication 2006-2012



STAY CONNECTED

+603-89118020 +603-89250439 imen@ukm.my

Institute of Microengineering and Nanelectronics (IMEN)

Level 4, Research Complex
Universiti Kebangsaan Malaysia
43600 UKM-Bangi, Selangor, Malaysia