ICBioE’11

2nd International Conference on Biotechnology Engineering

17 – 19 May 2011
Legend Hotel, Kuala Lumpur, Malaysia

PROGRAMME BOOK

Organized by
## CONTENT

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MESSAGES</strong></td>
<td>ICBioE’11-3</td>
</tr>
<tr>
<td>• Chairman, ICBioE’11</td>
<td>ICBioE’11-3</td>
</tr>
<tr>
<td><strong>INTERNATIONAL ADVISORY BOARD</strong></td>
<td>ICBioE’11-4</td>
</tr>
<tr>
<td><strong>LOCAL ADVISORY BOARD</strong></td>
<td>ICBioE’11-5</td>
</tr>
<tr>
<td><strong>REVIEWERS</strong></td>
<td>ICBioE’11-6</td>
</tr>
<tr>
<td><strong>ICBioE’11 ORGANIZING COMMITTEE</strong></td>
<td>ICBioE’11-7</td>
</tr>
<tr>
<td><strong>CONFERENCE PROGRAMME</strong></td>
<td>ICBioE’11-8</td>
</tr>
<tr>
<td><strong>KEYNOTE SPEAKERS</strong></td>
<td>ICBioE’11-11</td>
</tr>
<tr>
<td><strong>CONFERENCE SCHEDULE</strong></td>
<td>ICBioE’11-19</td>
</tr>
<tr>
<td>• Day – 1</td>
<td>ICBioE’11-22</td>
</tr>
<tr>
<td>• Day – 2</td>
<td>ICBioE’11-31</td>
</tr>
<tr>
<td>• Day – 3</td>
<td>ICBioE’11-37</td>
</tr>
<tr>
<td><strong>DEPARTMENT OF BIOTECHNOLOGY</strong></td>
<td>ICBioE’11-37</td>
</tr>
<tr>
<td><strong>ABSTRACTS</strong></td>
<td>ICBioE’11-38</td>
</tr>
</tbody>
</table>
MESSAGE FROM THE CHAIRMAN OF ICBioE’11

Prof. Dr. Md. Zahangir Alam
Chairman, ICBioE’11
Faculty of Engineering
International Islamic University Malaysia (IIUM)

Assalamualaikum Warahmatullahi Wabarakatuh, and Warm Greetings,

I am extremely delighted that the Faculty of Engineering, International Islamic University Malaysia (IIUM) is organizing the 2nd International Conference on Biotechnology Engineering 2011 (ICBioE’11).

The conference theme ‘Enhancing the Quality of Life through Emerging Biotechnology’ is hoped to create the links and collaboration among the researchers and industries through exploration of four key research areas of bioenvironmental, bioprocess, biomolecular and bionanotechnology engineering which not will enhance knowledge but also improve the quality of life with new processes and/or products.

On behalf of the ICBioE’11 organizing committee, we would like to extend a warm welcome to the distinguished speakers, participants and observers. We are pleased to announce that over 170 abstracts from more than 10 countries were received in which a total 130 technical papers have been accepted for oral presentation. With this large number of participants, this conference will provide opportunities for in-depth dialogue in the core areas of emerging biotechnology among practitioners in the biotechnology industry. It will also offer a unique platform for biotechnology professionals engaged in research, production of services and products, consultancy and education to share knowledge and ideas, to identify and update emerging issues.

I would like to take this opportunity to express my deepest regards to the members of organizing committee, members of the International and National Advisory Board, participants, observers, sponsors and reviewers whose involvement and cooperation have been invaluable in making this conference a success.

Wassalam
Prof. Dr. Md. Zahangir Alam
Chairman, ICBioE’11
International Islamic University Malaysia

ICBioE’11- 3
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Norshazila Shahidan
Erlina Abdullah
# ICBioE’11 Conference Programme – Day 1

**17th May, 2011 (Tuesday)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0830 - 0900</td>
<td>Registration</td>
</tr>
<tr>
<td>0900 - 0945</td>
<td>Opening Ceremony – Ballroom 1</td>
</tr>
<tr>
<td>0945 - 1000</td>
<td>Tea Break</td>
</tr>
<tr>
<td>1000 - 1300</td>
<td>Plenary Session I – Ballroom 2</td>
</tr>
<tr>
<td></td>
<td>Speaker I – Prof. Dr. Ng Wun Jern</td>
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<tr>
<td></td>
<td><em>Changing the Energy Balance in Sewage Treatment</em></td>
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<tr>
<td></td>
<td>Chairperson: Prof. Ir. Dr. Suleyman Aremu Muyibi</td>
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<td>Co-Chairperson: Dr. Ma’an Fahmi Rashid Al-Khatib</td>
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<tr>
<td></td>
<td>Speaker II - (NAME) (TITLE)</td>
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<td>Chairperson:</td>
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<td></td>
<td>Co-Chairperson:</td>
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<tr>
<td>1300 - 1400</td>
<td>Lunch Break</td>
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<tr>
<td>1400 - 1500</td>
<td>Plenary Session II – Ballroom 2</td>
</tr>
<tr>
<td></td>
<td>Speaker I – (NAME) (TITLE)</td>
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<td>Chairperson:</td>
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<td></td>
<td>Co-Chairperson:</td>
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<tr>
<td>1500 - 1530</td>
<td>Tea Break</td>
</tr>
<tr>
<td>1530 - 1730</td>
<td>Parallel Session I</td>
</tr>
<tr>
<td></td>
<td>BEE 1 (BOARDROOM I)</td>
</tr>
<tr>
<td></td>
<td>BME 1 (BOARDROOM II)</td>
</tr>
<tr>
<td></td>
<td>BPE 1 (BOARDROOM III)</td>
</tr>
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**Notes:**
- BME: Biomolecular Engineering
- BEE: Bioenvironmental Engineering
- BPE: Bioprocess Engineering
- BNT: BionanoTechnology Engineering
# ICBioE’11 CONFERENCE PROGRAMME – DAY 2

**18<sup>th</sup> May, 2011 (Wednesday)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>0900 - 1030</td>
<td><strong>Plenary Session III – Ballroom 2</strong>&lt;br&gt;<strong>Speaker I</strong> – Prof. Dr. Kazuo Miyashita&lt;br&gt;<em>Importance of Brown Seaweed as Nutraceuticals</em>&lt;br&gt;Chairperson: Prof. Dr. Md Zahangir Alam&lt;br&gt;Co-Chairperson: Assoc. Prof. Dr. Irwandi Jaswir</td>
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<tr>
<td>1030 - 1100</td>
<td>Tea Break</td>
</tr>
<tr>
<td>1100 – 1300</td>
<td><strong>Parallel Session II</strong>&lt;br&gt;BEE 2 <em>(BOARDROOM I)</em>&lt;br&gt;BME 2 <em>(BOARDROOM II)</em>&lt;br&gt;BPE 2 <em>(BOARDROOM III)</em></td>
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<tr>
<td>1300 - 1400</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>1400 - 1530</td>
<td><strong>Parallel Session III</strong>&lt;br&gt;BEE 3 <em>(BOARDROOM I)</em>&lt;br&gt;BME 3 <em>(BOARDROOM II)</em>&lt;br&gt;BPE 3 <em>(BOARDROOM III)</em></td>
</tr>
<tr>
<td>1530 - 1545</td>
<td>Tea Break</td>
</tr>
<tr>
<td>1545 - 1730</td>
<td><strong>Parallel Session IV</strong>&lt;br&gt;BEE 4 <em>(BOARDROOM I)</em>&lt;br&gt;BME 4 <em>(BOARDROOM II)</em>&lt;br&gt;BNT 1 <em>(BOARDROOM III)</em></td>
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<tr>
<td>2030 - 2130</td>
<td><em>Banquet Dinner</em></td>
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</tbody>
</table>

**Notes:**<br>
- **BME**: Biomolecular Engineering<br>- **BEE**: Bioenvironmental Engineering<br>- **BPE**: Bioprocess Engineering<br>- **BNT**: BionanoTechnology Engineering
### ICBioE’11 CONFERENCE PROGRAMME – DAY 3

**19th May, 2011 (Thursday)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0900 - 1000</td>
<td><strong>Plenary Session IV – Ballroom 2</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Speaker 1 – Prof. Dr. Mohamed Al-Rubeai</strong></td>
</tr>
<tr>
<td></td>
<td><em>Cellular and Molecular Markers of Productivity in CHO Cell Culture</em></td>
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<tr>
<td></td>
<td>Chairperson: Prof. Dr. Mohamed Ismail Bin Abd Karim</td>
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<tr>
<td></td>
<td>Co-Chairperson: Assoc. Prof. Dr. Maizirwan Mel</td>
</tr>
<tr>
<td>1000 - 1030</td>
<td><strong>Tea Break</strong></td>
</tr>
<tr>
<td>1030 - 1300</td>
<td>Parallel Session V</td>
</tr>
<tr>
<td></td>
<td>BEE 5 (BOARDROOM I)</td>
</tr>
<tr>
<td></td>
<td>BME 5 (BOARDROOM II)</td>
</tr>
<tr>
<td></td>
<td>BNT 2 (BOARDROOM III)</td>
</tr>
<tr>
<td>1300 - 1400</td>
<td><strong>Lunch Break</strong></td>
</tr>
<tr>
<td>1400 - 1530</td>
<td>Parallel Session VI</td>
</tr>
<tr>
<td></td>
<td>BEE 6 (BOARDROOM I)</td>
</tr>
<tr>
<td></td>
<td>BME 6 (BOARDROOM II)</td>
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<tr>
<td>1530 - 1545</td>
<td><strong>Tea Break</strong></td>
</tr>
</tbody>
</table>

**Notes:**

- BME: Biomolecular Engineering
- BEE: Bioenvironmental Engineering
- BPE: Bioprocess Engineering
- BNT: BionanoTechnology Engineering
KEYNOTE SPEAKER 1

PROF. DR. NG WUN JERN
Executive Director, Nanyang Environment and Water Research Institute
Professor, Division of Environmental and Water Resources Engineering
School of Civil and Environmental Engineering
Nanyang Technological University

Prof Ng interacts with the industry as an advisor in water and effluent treatment - and has brought R&D to full-scale applications. Commercialized IPs includes biosystems (eg aerobic SBR, anaerobic SBR, anaerobic filter and hybrid anaerobic reactor) and equipment (eg recirculating aerator and electrochemical system). His designs have been applied to some 120 full-scale installations. He had managed a “spin-off” company, was chairman on the board of directors at MWH (Montgomery, Watson & Harza) Consultants, is presently technical advisor on wastes to bio-energy to three companies operating in ASEAN, China and India, and had served on the national water reclamation expert panel. He is a registered professional engineer.

He teaches environmental engineering and science and has guided numerous postdoctoral fellows, and Masters and PhD candidates. He was a founding member of the Singapore Engineering Accreditation Board and contributed to Singapore's first Accreditation Manual for university engineering education.

He was Vice-Dean at the Faculty of Engineering, National University of Singapore and then Dean until 2003. In 2004 the Faculty was ranked 9th in a world ranking exercise conducted by Times London. From 2003 - 2004, he was founding Director of the Environmental Science & Engineering Program. In 2005 he was Singapore director of the Singapore-MIT Alliance serving the alliance universities - National University of Singapore, Nanyang Technological University, and Massachusetts Institute of Technology till 2006. Thereafter he was Director - Capability Development at the Environment & Water Industry Development Council, Ministry of the Environment & Water Resources working on national funding for R&D and manpower development. In 2007 he joined NTU and became founding Executive Director at the Nanyang Environment & Water Research Institute (NEWRI) which operates with five research centres and two groups covering education, research, development, and applications.
Changing the Energy Balance in Sewage Treatment

State-of-the-art sewage treatment as we know it today was first developed some 100 years ago. Over the century since the most significant change made to the process has been its modification from a batch to a continuous flow process. The design philosophy has, however, remained constant – begin with aerobic conversion of the carbonaceous pollutants to microbial biomass and thereafter to separate this biomass from the aqueous phase and hence achieving treatment of the water. The excess biomass so generated shall need to be disposed off and to reduce quantities it is digested. The latter may also be an aerobic process. Aerobic processes are energy intensive because of the need to move air. To help reduce the energy needed, anaerobic digestion of the excess biomass became more popular. This allowed some energy recovery by way of the biogas generated but the energy balance is still negative since only about a quarter of the in-plant energy required is recovered with this process layout.

This presentation examines the history of the activated sludge process – arguing that when it was first developed energy costs may not necessarily have been as significant an issue as it is today and likely more so going into the future. Subsequent inclusion of the anaerobic sludge digester improved the energy balance but it is still negative. The presentation shall examine two alternatives which have made their appearances in recent years. However, the MBR is noted to be even more energy intensive and so is unlikely to be able to replace the conventional activated sludge on the energy argument. The microbial fuel cell (MFC) holds promise as it provides treatment and electricity generation simultaneously but a costs comparison would suggest the MFC is still many years from fullscale application as an alternative to the activated sludge.

This presentation argues perhaps a change in design philosophy is needed. The current practise is to aerobically convert carbonaceous pollutants to biomass and then attempt to recover some energy (possibly anaerobically). The question then is why can energy not be recovered from the sewage before it is aerobically (or otherwise) treated? Since sewage can potentially have the equivalent of 1.7 kWh/m³, and treatment may only require 0.5 kWh/m³ or less, it is conceivable sewage treatment plants can be energy positive. To achieve this, the presentation argues design of sewage treatment plants should begin with anaerobic process instead of the aerobic process. A COD balance is provided to illustrate the difference in oxidation requirements (and hence energy requirements) which can occur as a change is made to the concept of leading with the anaerobic instead of following with the aerobic.
Prof. Kazuo Miyashita received his B.Sc. Agriculture at Tohoku University, Sendai, Japan in 1979 and completed his Ph.D. also at Tohoku University, in 1985. He then joined the Faculty of Fishery in Hokkaido University as instructor in chemistry and later became Professor of Bio-functional Material Chemistry there.

His specialties are chemistry and biochemistry of bioactive components including molecular biology of anti-obesity and anti-diabetes.

During the year 2006, he was awarded with Japanese Oil Chemists’ Society (JOCS) Award, Japanese Society of Fisheries Science Award and Bio-business Competition Japan 2006. Then, he obtained the Division Lecture’s Award in 2007. Thus far, he has published a total of 76 international books and reviews.

**Importance of Brown Seaweed as Nutraceuticals**

Interest in functionality of marine nutraceuticals continues to grow year by year, due to the fact that marine products are familiar to people and prevention of disease through marine dietary means has been better understood and recognized by the public at large. Now, new food industrial opportunities have been created for marine functional foods increasing with the data accumulation of metabolism and efficacy of a wide range of marine functional products, and with the developments in nutrigenomics of marine food products containing specific bio-actives.

Beneficial health effects of marine products are mainly considered to be due to marine lipids such as omega-3 polyunsaturated fatty acids (PUFA). Moreover, scientists are much interested in unique physiological activities of brown seaweed pigment, fucoxanthin. In the present study, I will focus on brown seaweed lipids containing both omega-3 PUFA and fucoxanthin for the elucidation of molecular mechanism of their activities. The analysis has been done using cellular and animal models.

Fucoxanthin showed anti-obesity effect on the basis of specific molecular mechanism. Nutrigenomic study reveals that fucoxanthin induces uncoupling protein 1 (UCP1)
expression in white adipose tissue (WAT) mitochondria to lead to oxidation of fatty acids and heat production in WAT. Fucoxanthin improves insulin resistance and decreases blood glucose level through the down-regulation of TNF in WAT of animals, and up-regulation and translocation of Glut4 in muscle. Both effects of fucoxanthin have been confirmed by cellular experiments.

On the other hand, omega-3 PUFA such as EPA and DHA are effective to improve lipid metabolism by affecting several key molecules in the liver. Moreover, omega-3 PUFA synergistically increased the fucoxanthin activities. We demonstrated brown seaweed lipids as ideal nutraceutical or functional food materials containing high level of omega-3 PUFA and fucoxanthin, which will apply to the purpose of reduction of a potent risk factor for obesity, Type II diabetes, hypertension, dyslipidemia, and cardiovascular disease. Furthermore, we evaluated pasta and baked products prepared with edible brown seaweed powder (5-20%) as an ingredient. The in vitro and in vivo antioxidant activity increased with increasing concentration of the seaweed powder due to the presence of the algal antioxidants. The ratio of omega-3 to omega-6 fatty acid in seaweed incorporated pasta (1:3.4) was very acceptable compared to the control pasta (1:15.2).
PROFESSOR ENGR. DR. SULEYMAN AREMU MUYIBI
Biotechnology Engineering Department, International Islamic University Malaysia

Brief Personal Profile
Hails from Osogbo, Osogbo Local Government, Osun State, Nigeria.

EDUCATION AND QUALIFICATION: He holds BS Engineering (cum laude) University of Central Florida, Orlando Florida, USA. MEng( Civil Engineering) majoring in Water Resources and Environmental Engineering from the University of Benin, Benin–City Nigeria, PhD in Environmental Engineering from the University of Newcastle, Newcastle Upon Tyne, UK and Postgraduate Diploma in Islamic Studies (DIS) from the International Islamic University Malaysia.

BRIEF CAREER PROFILE: I started my professional engineering career as a water / sewage engineer with UNIK/Halcrow Balfour Chartered Engineers and Consultants in Ibadan Nigeria in 1980 after completion of the compulsory one year National Youth Service Corps assignment with Niger State Water Board before joining the services of Federal Polytechnic Bida, Niger State Nigeria in the School of Construction and Environmental Technology in 1982. I transferred my services to the Department of Civil Engineering as Head of Department, Faculty of Technology, Bayero University Kano, Nigeria in 1988 where I served for about 10 years before taking early retirement in 1997 and relocating to Malaysia to the Faculty of Engineering Universiti Putra Malaysia. I returned to Nigeria in 2001 where I worked at the University of Maiduguri in the Faculty of Engineering during which period I served as Deputy Dean and Head of Department of Civil and Water Resources Engineering. I relocated to Malaysia in October 2002 and joined the services of International Islamic University Malaysia in the Faculty of Engineering. I was Head of Department of Biotechnology Engineering from 2004 – 2009. I became a Professor in July 2005 and was emplaced as Senior Professor in October 2011.

AREA OF EXPERTISE: My principal teaching, consultancy services and research interest which spans over 30 years include environmental biotechnology, nanotechnology, solid waste management water supply and treatment, wastewater treatment( municipal and industrial), water pollution control, development of bioactive materials for use in water and waste treatment, water resources management and environmental hydraulics. I have authored and co-authored more than 150 publications in journals, conferences, technical reports, and a textbook.
PROFESSIONAL AFFILIATIONS: I am a member of the Nigerian Society of Engineers (NSE), a registered civil Engineer (COREN, Nigeria), a member of the Malaysian National Committee on Irrigation and Drainage (MANCID), a Member of International Organisation on Bioengineering and Biotechnology (IOBB), a member of Nigerians in Diaspora Science and Technology Committee (DINISAT), member of Moringa News Network, Fellow of the Institute of Corporate Administration of Nigeria (FCAI), member of Malaysian Water Association (MWA, Associate member of Malaysian Society for Engineering and Technology, (MSET), member of NanoScience and Nanotechnology Research Group (NANORG) Faculty of Engineering IIUM, Islamic Values and Ethics in Engineering Research Group (IVEES- RG) Faculty of Engineering IIUM. Coordinator of the Bioenvironmental Engineering Research Unit (BERU), Centre of Excellence in Green Technology at the International Islamic University Malaysia.

**Development Of Nano-Materials For Applications In Bioenvironmental And Bioprocess Industries: BERU And NANORG Experiences At IIUM**

This paper gives an overview of current research efforts by Bioenvironmental Engineering Research Unit (BERU) and NanoScience and NanoTechnology Research Group (NANORG) at the International Islamic University Malaysia (IIUM) in the development of nano materials for applications in bioenvironmental and bioprocess industries. Some of the products and processes developed with very promising results include immobilization of Chitosan onto the surface of multi-walled carbon nanotubes for Lead Removal from water, removal of nickel from wastewater by using Carbon-Nanofibre impregnated on Activated Carbon, development of Polypropylene Ternary Nanocomposite using modified Nanoclay (MNC) and Multi-Walled Carbon Nanotubes (MWCNT) as fillers in the polypropylene matrix for fabrication of chemical and bio process vessels, sewerage pipes, septic tanks, water and chemical storage tanks, delivery pipes, hot water pipe, bioreactor liner material due to its good thermal stability, high tensile properties and high chemical resistance. Removal of Mn $^{2+}$ from aqueous solution by locally produced Multiwalled Carbon NanoTubes (MCNT). Production of multi-walled carbon nanotubes (MWCNT) and Carbon nanofibre(CNF) using Carbon Vapour Deposition (CVD) in a locally developed reactor. Arsenic Adsorption from Water by Carbon Nanofibres Grown on Powdered Activated Carbon Impregnated with nickel, application of Functionalized and non-Functionalized Carbon Nanotubes for Skim Latex Protein Purification.
KEYNOTE SPEAKER 4

PROF. DR. MOHAMED AL-RUBEAI
Head of Bioprocess Engineering
UCD College of Engineering, Mathematical & Physical Sciences,
University College Dublin, Belfield, Dublin 4, Ireland

Professor Mohamed Al-Rubeai obtained his PhD in Genetics from QMC, University of London. He worked as a research fellow at the University of Surrey. He then moved to the University of Birmingham in 1988 and was appointed to the Chair of Biotechnology in 2000. In 2005 he moved to University College Dublin to take up the newly established Chair of Biochemical Engineering and to headship the Cell Culture Engineering Research Centre. He was an adjunct Professor at the University of Queensland, Australia (1997-2000) and at the University of Birmingham (2005-2008).

Professor Al-Rubeai is the editor of "Cell Engineering", reviews editor of "Cytotechnology", member of editorial board of "Biotechnology and Bioengineering" and "Biotechnology and Applied Biochemistry", recipient of the Donald Medal 2008, fellow of the Society of Biology, member of Sigma-Aldrich and Vivalis advisory boards, scientific advisor to the President of Iraq and advisor to UNESCO. He is a co-author of "Engineering a Knowledge Island 2020".

He was appointed as fellow at Conway Institute of Biomolecular & Biomedical Research, National Institute for Bioprocessing Research and Training (NIBRT) and UK Institute of Biology (FIBiol).

He authored over 400 professional papers, reviews, chapters and patents that reflect his broad interest in production of biopharmaceuticals, mammalian cell culture, tissue engineering, stem cell bioprocessing, metabolic engineering and biomaterials.

He supervised 39 PhD and 40 MSc dissertations, gave more than 50 invited talks in international conferences, lectured in more than 50 universities, research institutes and biopharmaceutical companies and awarded in excess of 15M Euro as research grants.
Cellular and Molecular Markers of Productivity in CHO Cell Culture

Stable and high productive cell line development is usually time-consuming and labour intensive process. Identifying cellular and molecular markers that can predict growth and productivity is extremely useful to avoid unnecessary processing steps and may help to increase our understanding of the mechanism of product formation, and consequently improving the way cell lines are engineered and selected. We have studied several morphological and molecular markers of productivity in CHO cell lines that produce different levels of monoclonal antibody and have identified a range of cellular, metabolic and molecular factors that may act synergically to influence productivity. The results of work that employed genomics, metabolomics and cytomics will be presented to provide an overview of the complexity of the cellular process of antibody production. Through the application of omic analysis to batch, chemostat and perfusion cultures we aim to improve the identification of gene and protein expression patterns and novel gene targets that might influence productivity.
<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
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1Sudan University of Science & Technology, Sudan.  
2Universiti Putra Malaysia, Malaysia. |
| 24 | Range Finding Test of Hydrocarbon on Scirpus mucronatus as Preliminary Test for Phytotoxicity of Contaminated Soil. Ipung Fitri Purwanti, Siti Rozaimah Sheikh Abdullah, Hassan Basri, Mushrifah Idris, Ainon Hamzah, Mohd Talib Latif & Muhammad Mukhlisin. Universiti Kebangsaan Malaysia, Malaysia. |
1International Islamic University Malaysia, Malaysia.  
2Graduate School of Engineering Osaka Prefectural University, Japan. |
**ICBioE’11 CONFERENCE SCHEDULE (DAY 1, 17 MAY 2011)**

**Parallel Session: BME 1 (Biomolecular Engineering)**
Chairperson: Assoc. Prof. Dr. Ibrahim Ali Noorbatcha
Co-chairperson: Dr. Azura Bt. Amid

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Improving Prosthetic Treatment by Assisted Electromyographic Analysis of Masticatory Dysfunctions. ŞTEŢIU Mircea¹, GHINESCU Minerva Claudia², GHINESCU Marian¹ &amp; ŞTEŢIU Andreea Angela¹. ¹University Sibiu, Romania. ²University Bucharest, Romania.</td>
</tr>
<tr>
<td>9</td>
<td>Predicting Group of Metabolites Available in Partially Purified Tomato Leaves Extract Showing Anticancer Activity by HPLC and FTIR. W. D. Wan Chik, A. Amid &amp; P. Jamal. International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>10</td>
<td>Observation on Antioxidant Activity from Leaves, Callus and Suspension Culture of Justicia gendarusa. Azura Amid¹, Nurul Najwa Johan¹, Parveen Jamal¹ &amp; Wan Norzaidani Wan Mohd Zain². ¹International Islamic University Malaysia, Malaysia. ²Melaka Institute of Biotechnology, Malaysia.</td>
</tr>
<tr>
<td>11</td>
<td>Tomato Leaves Methanol Extract Possess Anti inflammatory Activity via Inhibition of Lipopolysacharide (LPS)-induced Prostaglandin (PGE2). S. Semail, A. Amid &amp; P. Jamal. International Islamic University Malaysia, Malaysia.</td>
</tr>
</tbody>
</table>
## Parallel Session: BPE 1 (Bioprocess Engineering)

**Chairperson:** Assoc. Prof. Dr. Maizirwan Mel  
**Co-chairperson:** Dr. Yumi Zuhani Has-Yun Hashim

### 1530-1730 (Boardroom 3)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 8  | **Differential Scanning Calorimetry as Tool in Observing Thermal and Storage Stability of Recombinant Bromelain**  
*Nurul Azira Bt Ismail & Azura Bt Amid.*  
*International Islamic University Malaysia, Malaysia.* |
| 12 | **Evaluation of Antibacterial Activity from Flowering Plants and Optimization of Process Conditions for the Extraction of Antibacterial Compounds from Spathiphylum cannifolium Leaves**  
*Erlina Abdullah, Raha Ahmad Raus & Parveen Jamal.*  
*International Islamic University Malaysia, Malaysia.* |
| 13 | **Electrochemical Generation of Superoxide Ion-radical in 1-Hexyl-1-Methyl-Pyrrolidinium Bis (Trifluoromethylsulfonyl) Imide**  
*Maan Hayyan¹, Farouq S. Mjalli¹², Mohd Ali Hashim¹ & Inas M. AlNashef³.*  
¹University of Malaya, Malaysia.  
²Sultan Qaboos University, Oman.  
³King Saud University, Saudi Arabia. |
| 33 | **Solid State Fermentation for the Production Of β-Glucosidase by Co-Culture of Aspergillus niger and A. oryzae**  
*GC University, Pakistan.* |
| 34 | **Preliminary Study of Cellulbiohydrolase Production from Aspergillus niger Using Static Liquid Culture Fermentation**  
*‘Abidah Md Noh, Jamaliah Md Jahim, Abdul Munir Abdul Murad & Farah Diba Abu Bakar.*  
*Universiti Kebangsaan Malaysia, Malaysia.* |
| 49 | **Screening Significant Media for Production of Bioprotein Using Statistical Approach**  
*Hafiza Binti Shukor, Ahmad Anas Nagoor Gunny & Nor Hidayah Binti Bohari.*  
*Universiti Malaysia Perlis, Malaysia.* |
| 50 | **Effect of Partial Replacement of Sucrose with the Artificial Sweetener Sucralose on the Physico-Chemical, Sensory, Microbial Characteristics, and Final Cost Saving of Orange Nectar**  
*Maher M. Al-Dabbas.*  
*University of Jordan, Jordan.* |
| 38 | **Antioxidant Properties Of Raw Garlic (Allium Sativum) Extract**  
*M. M Rahman, V. Fazlic and N. W. Saad.*  
*International Islamic University Malaysia, Malaysia.* |
<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>Evaluation of Palm Oil Mill Effluent Treatment with Concomitant Phenolics Production by <em>Aspergillus niger</em> IBS-103ZA Zulkarnain Mohamed Idris¹, ², Parveen Jamal² &amp; Md. Zahangir Alam². ¹Universiti Malaysia Perlis, Malaysia. ²International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>32</td>
<td>Thermostable β-1,4-Glucosidase from <em>Thermotoga petrophila</em> Displaying Highest Ever Reported Enzyme Activity Ikram Haq, Mahmood Ali Khan, Bushra Muneer, Zahid Hussain, Sumra Afzal, Sana Majeed and Muhammad Mohsin Javed GC University, Pakistan.</td>
</tr>
<tr>
<td>54</td>
<td>Comparative Study of the Chemical Kinetics of Two Catalysts Used for Esterification of Sludge Palm Oil Adeeb Hayyan¹, Mohamed E. S. Mirghani¹, Md. Zahangir Alam¹, Nassereeldeen A. Kabbashi¹, Noor Irma Nazashida Mohd Hakimi², Yosri Mohd Siran² &amp; Shaugaluddin Tahiruddin². ¹International Islamic University Malaysia, Malaysia. ²Sime Darby Research Sdn. Bhd., Malaysia.</td>
</tr>
<tr>
<td>44</td>
<td>Analysis of Municipal Wastewater Treatment Plant Performance Using Artificial Neural Network Approach Husain, I. A., Jami, M. S., Kabashi, N. A., &amp; Abdullah, N. International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>45</td>
<td>Enhancement of Dewatering Properties of Kaolin Suspension by Using Cationic Polyacrylamide (PAM-C) Flocculant and Surfactants Jabir Hussain, Mohammed Saedi Jami &amp; Suleyman Aremu Muyibi. International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>ID</td>
<td>Title, Author(s) and Affiliation</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>41</td>
<td><strong>In-vitro Anti-microbial and Brine-shrimp Lethality Potential of the Leaves Extract of Nahar</strong></td>
</tr>
<tr>
<td></td>
<td><em>Mesua ferrea</em> Plant</td>
</tr>
<tr>
<td></td>
<td>Ahmed Idris Adewale, Elwathig Mohamed Saeed Mirghani, Suleyman Aremu Mayibi,</td>
</tr>
<tr>
<td></td>
<td>Jamal Ibrahim Daoud &amp; Mikail Maryam Abimbola.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>74</td>
<td><strong>Screening of Antifungal Activities from Genera Trametes Against Growth of Selected</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Wood-degrading Fungi from Malaysia</strong></td>
</tr>
<tr>
<td></td>
<td>Yi Peng, Teoh &amp; Mashitah, Mat Don.</td>
</tr>
<tr>
<td></td>
<td>Universiti Sains Malaysia, Malaysia.</td>
</tr>
<tr>
<td>76</td>
<td><strong>Stability of Palm Olein-In-Water Cream Preparations Containing Hirudinaria</strong></td>
</tr>
<tr>
<td></td>
<td><strong>manillensis Extracts for Improving Blood Flow</strong></td>
</tr>
<tr>
<td></td>
<td>Mat Sharil Abdul Talib, Kausar Ahmad, Maryanto &amp; Juliana Md Jaffri.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>81</td>
<td><strong>Identification of Carotenoid Composition in Selected ‘Ulam’ or Traditional</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Vegetables in Malaysia</strong></td>
</tr>
<tr>
<td></td>
<td>Fatimah Azzahra Mohd Zaifuddin, Norazian Mohd Hassan &amp; Rashidi Othman.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia.</td>
</tr>
<tr>
<td>83</td>
<td><strong>Dynamical Behaviour of Native Endoglucanase from Fusarium oxysporum</strong></td>
</tr>
<tr>
<td></td>
<td>Noorbatcha, I. A., Waesoho, S. &amp; Salleh, H.M.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia.</td>
</tr>
<tr>
<td>85</td>
<td><strong>Use of the Hevein Promoter to Direct Expression Of Human Protamine 1, a</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Pharmaceutical Protein, in Hevea Brasiliensis Latex</strong></td>
</tr>
<tr>
<td></td>
<td>Siti Shuhada Shuib¹, Sunderasan Elumalai², Badrul Ezam Badaruddin¹ &amp; Arokiaraj</td>
</tr>
<tr>
<td></td>
<td>Pappusamy².</td>
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<td></td>
<td>¹Malaysian Rubber Board, Malaysia.</td>
</tr>
<tr>
<td></td>
<td>²International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>87</td>
<td><strong>Molecular Dynamics Approach in Designing Thermostable Bacillus circulans</strong></td>
</tr>
<tr>
<td></td>
<td>Xylanase</td>
</tr>
<tr>
<td></td>
<td>Noorbatcha, I. A., Salleh, H.M. &amp; Hadi, M. A.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia, Malaysia.</td>
</tr>
<tr>
<td>89</td>
<td><strong>Optimization of Extraction Process for Antidiabetic Compounds from Cucumis</strong></td>
</tr>
<tr>
<td></td>
<td>sativus</td>
</tr>
<tr>
<td></td>
<td>Anumsima Ahmad Barkat, Parveen Jamal &amp; Azura Amid.</td>
</tr>
<tr>
<td></td>
<td>International Islamic University Malaysia, Malaysia.</td>
</tr>
</tbody>
</table>
### Parallel Session: BPE 2 (Bioprocess Engineering)

**Chairperson:** Prof. Dr. Mohamed Ismail Abd. Karim  
**Co-chairperson:** Dr. Raha Bt. Ahmad Raus

**1100-1300 (Boardroom 3)**

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 55 | Bioethanol Production by Calcium Alginate-immobilised ST1 Yeast System: Effects of Size of Beads, Ratio and Concentration  
Masniroszaime Md Zain & Noorhisham Tan Kof.  
Universiti Kebangsaan Malaysia, Malaysia. |
| 57 | Screening of Biosurfactants from Marine Microorganisms  
AL-Araji, Laith¹ & Kadum, R. H. J².  
¹International Islamic University Malaysia, Malaysia.  
²Universiti Malaysia Pahang, Malaysia. |
| 73 | Role of Bacteriocins from Lactic Acid Producing Bacteria in Food Safety  
University of Agriculture, Pakistan. |
| 110 | Empirical Modelling for Pasteurisation Process of Pink Guava Puree Using Tubular Heat Exchanger  
W. M. F. Wan Mokhtar¹², F. S. Taip², N. Abdul Aziz² & S. B. Mohd Noor².  
Universiti Sultan Zainal Abidin, Malaysia.  
Universiti Putra Malaysia, Malaysia. |
| 116 | Optimization of Newcastle Disease Virus Production in T-flask  
Mohd Azmir Arifin¹, Siti Hajar Salim¹, Maizirwan Mel¹, Mohamed Ismail Abdul Karim¹ & Sharifah Syed Hassan².  
¹International Islamic University Malaysia, Malaysia.  
²Monash University Sunway Campus, Malaysia. |
| 126 | Supercritical Fluid Extraction of Bioactive Flavonoid from Strobilanthes crispus (Pecah Kaca) and its Comparison with Solvent Extraction  
Stashia Eleaness R.A. & Liza M.S.  
Universiti Teknologi Malaysia, Malaysia. |
| 128 | Prediction of Significant Factors in the Production of Ethanol by Ragi Tapai Co-Culture Using Taguchi Methodology  
Azlin S. Azmi¹², Cheng G. Ngoh¹ & Maizirwan Mel².  
¹University of Malaya, Malaysia.  
²International Islamic university Malaysia, Malaysia. |
| 130 | Optimization of Cassava Peel Medium to an Enriched Animal Feed by the White Rot Fungi Panus tigrinus M609RQY  
International Islamic University Malaysia, Malaysia. |
### Parallel Session: BEE 3 (Bioenvironmental Engineering)

**Chairperson:** Prof. Ir. Dr. Suleyman Aremu Muyibi  
**Co-chairperson:** Assoc. Prof. Dr. Mohamed Elwathig Saeed Mirghani

#### 1400-1530 (Boardroom 1)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 46 | Ammonical Nitrogen Effluent Prediction Using Artificial Neural Network  
Mustapha Mujeli, Mohammed S. Jami & Nassereldeen A. Kabbashi.  
International Islamic University Malaysia, Malaysia. |
| 47 | Chemical Treatment of Palm Oil Mill Effluent (POME) from Aerated Pond  
Idris M. A, Jami M. S. & Muyibi S. A.  
International Islamic University Malaysia, Malaysia. |
| 42 | Disinfection Kinetics of Nahar (*Mesua ferrea*) Seed Kernel’s Oil Using Pour Plate Method of the Heterotrophic Plate Count  
Ahmed Idris Adewale, Mohamed Elwathig Saeed Mirghani, Suleyman Aremu Muyibi, Jamal Ibrahim Daoud & Mikail Maryam Abimbola.  
International Islamic University Malaysia, Malaysia. |
| 60 | Characterization of Purified Cellulase from Fermentation of Sewage Sludge  
Muna Tasnim Mukhtaruddin, Md. Zabangir Alam & M. Hamzah Salleh.  
International Islamic University Malaysia, Malaysia. |
| 80 | Bioconversion of Empty Fruit Bunches (EFB) and Palm Oil Mill Effluent (POME) into Compost Using *Trichoderma virens*  
Dayana Amira R.¹, Roshanida A. R², Rosli M. I.¹, Siti Fatimah Zahrah M. F.¹, Mohd Anuar J.¹ & Nazrul Adha C.M.²  
Universiti Teknologi Malaysia, Malaysia.  
| 63 | Some Biological Activities of Malaysian Leech Saliva Extract  
International Islamic University Malaysia, Malaysia. |
### Parallel Session: BME 3 (Biomolecular Engineering)

**Chairperson:** Assoc. Prof. Dr. Parveen Jamal  
**Co-chairperson:** Dr. Azura Bt. Amid

#### 1400-1530 (Boardroom 2)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 90 | Molecular Dynamics Study of the Effect of Calcium Ions on the Thermostability of *Bacillus amyloliquefaciens* Phytase  
Noorbatcha, I. A., Sultan, A. M., Amid, A. & Salleh, H. M.  
International Islamic University Malaysia, Malaysia. |
| 92 | Purification of Xanthine Oxidase Inhibitor from *Carica papaya* Leaves Using Reversed Phase Flash Column Chromatography (RPFCC) - High Performance Thin Layer Chromatography (HPTLC)  
Saiful Mohammad Nizam Azmi, Parveen Jamal & Azura Amid.  
International Islamic University Malaysia, Malaysia. |
| 93 | Computer Aided Design of Polygalacturonase II from *Aspergillus niger*  
Ibrahim Ali Noorbatcha, Nur Izzah Ismail & Hamzah Mohd Salleh.  
International Islamic University Malaysia, Malaysia. |
| 95 | Phytochemical Screening for Antibacterial Activity of Potential Malaysian Medicinal Plants  
International Islamic University Malaysia. |
| 100 | Site Directed Mutagenesis to Improve PhyfaUIA1 Phytase Activity for Animal Feed  
Hamzah Mohd. Salleh & Nurhusna Samsudin.  
International Islamic University Malaysia. |
| 102 | Screening and Optimization of Media Components for Phytase Production of ASUIA 279 in *Pichia pastoris* System Using Statistical Design  
International Islamic University Malaysia, Malaysia. |
### Parallel Session: BPE 3 (Bioprocess Engineering)

Chairperson: Prof. Dr. Kazuo Miyashita  
Co-chairperson: Assoc. Prof. Dr. Irwandi Jaswir

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 134 | Effects of Different Types of Growth Media on Metabolite Profiles (GCMS-based) of CHO-K1 Cells Expressing IGF-1 Proteins  
Salfarina Ezrina Mohmad Saberi¹, Yumi Zuhanis Has-Yun Hashim¹, Vasila Packeer Mohamed¹, Azura Amid¹, Raha Ahmad Raus¹, Maizirwan Me¹, Micheal J. Gibney², Lorraine Brennan³ & Mohamed Al Rubeai³  
¹International Islamic University Malaysia, Malaysia.  
²UCD Institute of Food and Health, Ireland.  
³University College Dublin, Ireland. |
| 135 | Nano-structural Analysis of Fish Collagen Extracts for New Process Development  
International Islamic University Malaysia, Malaysia. |
| 137 | Effects of Spray Drying on Protein Content of Natural Rubber Serum (NRS)  
Aimi Izyana Ismail & Dr. Zairossani Mohd. Nor.  
Malaysian Rubber Board, Malaysia. |
| 138 | Waste Cooking Oil Transesterification: Influence of Impeller type, Speed And Bottom Clearance On Fame Yield  
Nabeel A. Adeyemi, AKM Mohiuddin & Tariq Jameel.  
International Islamic University Malaysia, Malaysia. |
| 157 | Reverse Micelle Liquid-Liquid Extraction of Protein  
Siti Hamidah Mohd Setapar & Siti Norazimah Mohamad Aziz Costantine Joannes.  
Universiti Teknologi Malaysia, Malaysia. |
| 164 | Pre-treatment of Pressed Pericarp Fibers using Polyhydric Alcohols in Pressurized Reactor  
Kiew Ling, H., Swee Pin, Y. & Mashitah, M.D.  
Universiti Sains Malaysia, Malaysia. |
<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 62 | An Isolated Bacterial Consortium for Crude Oil Biodegradation  
International Islamic University Malaysia, Malaysia. |
| 82 | The Potential of Artificial Neural Network (ANN) in Optimizing Bioconversion Process: In Case of Media Constituents of Citric Acid Production from Palm Oil Empty Fruit Bunches (EFB)  
Ricca Rahmaan Nasaruddin, Mohammed Saedi Jami & Md. Zahangir Alam.  
International Islamic University Malaysia, Malaysia. |
| 91 | Solid State Fermentation of Gibberellic Acid by *Penicillium* Variable Using Selected Food Processing Wastes as a Substrate  
Nur Kamilah, M. I. & Mashitah, M. D.  
Universiti Sains Malaysia, Malaysia. |
| 86 | Optimum Medium Components for Biosurfactant Production by *Klebsiella pneumoniae* WMF02 Utilizing Sludge Palm Oil as a Substrate  
International Islamic University Malaysia, Malaysia. |
| 88 | LMOs/GMOs, the Environment and the People: a Critical Exposition  
Abdul Haseeb Ansari & Parveen Jamal.  
International Islamic University Malaysia, Malaysia. |
| 84 | Artificial Neural Network for Modelling Coagulant Dosing for Water Treatment Plants  
International Islamic University Malaysia, Malaysia. |
| 96 | Comparative Study on Production of Bio-ethanol from Oil Palm Trunks Sap by Different *Saccharomyces Cerevisiae* Strain and Effects of Pretreatment  
Universiti Malaysia Pahang, Malaysia. |
## Parallel Session: BME 4 (Biomolecular Engineering)

**Chairperson:** Prof. Dr. Chris J. Hewitt  
**Co-chairperson:** Assoc. Prof. Dr. Ibrahim Ali Noorbacha

### 1545-1730 (Boardroom 2)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 103 | **On-column Refolding of Recombinant Fungal Endoglucanase I**  
International Islamic University Malaysia, Malaysia. |
| 115 | **Expression of a Fusarium oxysporum Endoglucanase in Kluyveromyces lactis**  
Farid Moukit, Azura Amid & Hamzah Mohd. Salleh.  
International Islamic University Malaysia, Malaysia. |
| 117 | **Simple Process Capability Analysis and Quality Validation of Monoclonal Antibody Production in Bench-top Bioreactor**  
Maizirwan Mel, Mohd Azmir Arifin, Mohamed Ismail Abdul Karim & Faridah Yusof.  
International Islamic University Malaysia, Malaysia. |
| 125 | **Heterologous Expression of Bromelain in Escherichia coli**  
Bala, M., Salleh, H. M., Amid, A., Mel, M. & Jami, M. S.  
International Islamic University Malaysia, Malaysia. |
| 127 | **Yeast Identification from Domestic Ragi for Food Fermentation by PCR Method**  
Siti Hajar M. D., Noorhisham T. K. & Nurina A.  
Universiti Kebangsaan Malaysia, Malaysia. |
| 133 | **The Investigation of the Nucleation Center for Protein Folding using Combined Knowledge-based and Molecular Dynamics Simulation**  
Nurul Bahiyah Ahmad Khairudin, Habibah A Wahab  
Universiti Teknologi Malaysia  
Universiti Sains Malaysia |
| 133 | **Scheme of Obtaining β-carotene Standard from Pumpkin (Cucurbita moschata) Flesh**  
Norshazila Shahidan¹, Rashidi Othman², Irwandi Jaswir² & Yumi Zahanis Has-yun Hashim².  
¹Universiti Sultan Zainal Abidin, Malaysia.  
²International Islamic University Malaysia, Malaysia. |
## ICBioE’11 CONFERENCE SCHEDULE (DAY 2, 18 MAY 2011)

### Parallel Session: BNT 1 (Bionano Technology Engineering)

**Chairperson:** Assoc. Prof. Dr. Faridah Yusof  
**Co-chairperson:** Dr. Ma’an Fahmi Rashid Al-Khatib

### 1545-1730 (Boardroom 3)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 19 | *In vitro* Degradation of Thin Films and Tissue Engineering Scaffolds Based on Biodegradable Polymers  
Naznin Sultana, Mohammd Rafiq bin Abd Kadir, Fadzilah Adibah Abd Aziz & Norsamsiah binti Muhammad Wahab.  
Universiti Teknologi Malaysia, Malaysia. |
| 20 | The Effect of Plasticizers and Citric Acid on Sago Starch Bio-Plastics  
International Islamic University Malaysia, Malaysia. |
| 26 | Remineralization Effect of New Type of Glass Ionomer Based Root Canal Sealer  
Ammar A. Mustafa, Khalid A. S. Al-Khateeb & Ahmad Faris Ismail.  
International Islamic University Malaysia, Malaysia. |
| 29 | Protein Purification Using Immobilized Metal Ions Affinity Zeolite Adsorbent  
Nurul Sa’adah Sulaiman, Su Najwa Mohamed & Suriyati Salleh.  
Universiti Malaysia Pahang, Malaysia. |
| 37 | Optimization of Process Parameters for the Production of Polypropylene Ternary Nanocomposites  
Suleyman A. M, Faridah Y, Ma’an A. F, Salawudeen T. O & Qasim H. S.  
International Islamic University Malaysia, Malaysia. |
| 65 | Isolation and Analytical Characterization of Local Malaysian Leech Saliva Extracts  
Mohamed Alaama, Abdualrahman M Abdualkader, Abbas Mohammad & Ahmed Merzouk.  
International Islamic University Malaysia, Malaysia. |
| 77 | Instantaneous Biosynthesis of Silver Nanoparticles by Selected Macro Fungi  
Yen San, Chan & Mashitah, Mat Don.  
Universiti Sains Malaysia, Malaysia. |
<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 99 | Computers and Electronic Devices Waste: Analytical Study  
    Shihab A. Hameed & Othman O. Khalifa.  
    International Islamic University Malaysia, Malaysia. |
| 106 | Composting of Food and Yard Wastes by Locally Isolated Fungal Strains  
    Opatokun Suraj Adebayo, Nassereldeen. A. Kabbashi, Md. Zahangir Alam, Aliyu Salihu,  
    Alade Abass & Tijani I.R.D.  
    International Islamic University Malaysia, Malaysia. |
| 111 | Process Optimization in Citric Acid Production Using Sewage Sludge as Fermentation Media  
    Nur Hanis Mohamad Hanapi, Md. Zahangir Alam & Mohamed Ismail Abdul Karim.  
    International Islamic University Malaysia, Malaysia. |
| 121 | Adsorption of Congo Red Onto Acid Activated Water Hyacinth  
    ¹Sohar University, Oman.  
    ²Taylor’s University, Malaysia. |
| 123 | Preliminary Test of Hydrocarbon Exposure on Salvinia molesta in Phytoremediation Process  
    Israa Abdulwahab Albaldawi, Siti Rozaimah Sheikh Abdulla & Fatihah Suja’.  
    Universiti Kebangsaan Malaysia, Malaysia. |
| 129 | Growth Kinetic Study and Modelling of Ethanol Production by Saccharomyces cerevisae  
    Farah Ahmad.  
    International Islamic University Malaysia, Malaysia. |
| 140 | Development of Semifluidized Bed Bioreactor as Novel Bioreactor System for the Treatment of Palm Oil Mill Effluent (POME)  
    Abass O. Alade, Ahmad T. Jameel, Suleyman A. Muyibi, Mohamed I. Abdul Karim & Md.  
    Zahangir Alam.  
    International Islamic University Malaysia, Malaysia. |
| 145 | Enzymatic Production of Xylitol and Future Prospects  
    ¹Universiti Malaysia Pahang, Malaysia.  
    ²University of Chittagong, Bangladesh. |
| 14 | Visual Plumes Coastal Dispersion Modeling in South-West Sabah  
    Zaki Zainudin  
    International Islamic University Malaysia |
| 6 | Evaluation of compatible fungal mixed culture for composting process  
    Noor Mohammad, Md. Zahangir Alam  
    International Islamic University Malaysia |
### Parallel Session: BME 5 (Biomolecular Engineering)

**Chairperson:** Prof. Dr. Mohamed Al-Rubeai  
**Co-chairperson:** Dr. Yumi Zuhani Has-Yun Hashim

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 136 | Isolation of Fucoxanthin and Fatty Acids Analysis from *Padina australis* and Cytotoxicity Effect of Fucoxanthin on Human Lung Cancer (H1299) Cell Lines  
Dedi Noviendri¹,², Irwandi Jaswir¹, Hamzah Mohd. Salleh¹, Muhammad Taher¹ & Kazuo Miyashita¹.  
¹International Islamic University Malaysia, Malaysia.  
²Ministry of Marine Affairs & Fisheries, Indonesia.  
³Hokaido University, Japan. |
| 148 | Determination of Fatty Acid Components in the Oak Fruits (*Quercus spp*) of Khamza Mountain Oak Forest of Sulaimani / Iraqi Kurdistan Region  
Noori Hassan Ghafoor.  
University of Sulaimani, Iraq. |
| 149 | Effects of Microbial and Chemical Fertilization on Yield and Seed Quality of Faba Bean (Vicia faba)  
Ahmed Mohamed Elhasan Rugheim¹ & Migdam Elsheikh Abdelgani².  
¹Omdurman Islamic University, Sudan.  
²National Centre for Research Khartoum, Sudan. |
| 156 | Optimization of Inducers on Expression of Recombinant Chitinase in *Escherichia coli* Using Response Surface Methodology  
Rohaida Che Man, Norheziwan Bin Hamsah, Shalyda Md Shaarani @ Md Nawi, Siti Zubaidah Sulaiman, Shariza Jamek & Zatul Iffah Mohd Arshad.  
Universiti Malaysia Pahang, Malaysia. |
| 158 | Bioactivity Analysis of Lemongrass (*Cymbopogan citratus*) Essential Oil  
Mohamed Elwathig Saeed Mirghani, Liyana Yahya & Parveen Jamal.  
International Islamic University Malaysia, Malaysia. |
| 48  | Culture Condition For The Production of Glucoamylase Enzyme by Different isolates of *Aspergillus spp.*  
Suhair A. Abdalwaab¹, Sirag A. Ibrahim² and Elham, SH. Dawood³  
¹Ministry of Agriculture and Forestry, Sudan  
²Khartoum University, Faculty of Science, Sudan  
³Wadi Elnile University, Sudan |

*ICBioE’11 CONFERENCE SCHEDULE (DAY 3, 19 MAY 2011)*

Continue on next page
## Parallel Session: BME 5 (Biomolecular Engineering)

**Chairperson:** Prof. Dr. Mohamed Al-Rubeai  
**Co-chairperson:** Dr. Yumi Zuhani Has-Yun Hashim

### 1030-1300 (Boardroom 2)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 160 | An Intermediate Region in C-terminal of Phosphoprotein is Required for Binding to Nucleocapsid of Newcastle Disease Virus  
Raha Ahmad-Raus¹, Tan Wen Siang² & Khatijah Yusoff²  
¹International Islamic University Malaysia, Malaysia.  
²Universiti Putra Malaysia, Malaysia. |
| 162 | Cloning of pCDNA3-IgG4 and pQE-2–IgG4 Human Hinge Region cDNA for Intrasplenic and Intraperitoneal Immunization  
Daruliza Kernain, Rahmah Noordin & Ming Thong Ong  
Universiti Sains Malaysia, Malaysia. |
| 166 | Production of Effective Microorganism Using Halal-based Sources: A Review  
M. M. A Abdullah, A. H. M. Radzi, N. A. M. Saleh, S. Z. Kamal & N. D. Yaacob  
Universiti Malaysia Perlis, Malaysia. |
| 174 | Reduction of Feeding by the Gregarious Nymphs of the Desert Locust, Schistocerca gregaria (Forskal), Following Infection by the Fungal Pathogen, Metarhizium anisopliae var. acridium (Metch)  
Ishraga Mohamed El Hassan1 & Magzoub O. Bashir2  
¹Plant Protection Directorate, Sudan.  
²International Centre of insect Physiology and Ecology (ICIPE), Sudan. |
## ICBioE’11 CONFERENCE SCHEDULE (DAY 3, 19 MAY 2011)

### Parallel Session: BNT 2 (Bionano Technology Engineering)

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 39  | Preparation, Characterization and Application of Zeolite-Y (Na-Y) for Water Filtration  
M. M Rahman & M. B. Awang.  
International Islamic University Malaysia. |
| 109 | Enhancement of Polymerase Chain Reaction Using Graphene Nano-flakes  
Abdul Khaliq Rasheed, Raed M. Kafafy, Waleed Fekry Faris & Hamzah Mohd Salleh.  
International Islamic University Malaysia, Malaysia. |
| 151 | AC Magnetic-field Induced and Photoexcited Cancer Cell (HeLa) Killing Efficacy of Mixed α and γ-Fe₂O₃ Superparamagnetic Nanoparticles  
Kagoshima University, Japan. |
| 161 | Adoption of New Engineering Systems for Base Maps Production and Crop Monitoring Case Study: (Kenana Sugar Cane Crop)  
Fatima Awad Allah & Eltaib Ganawa.  
Future University, Egypt. |
| 165 | Various Carbon Nanomaterials (CNMs) Synthesized on Powdered Activated Carbon by CVD Reactor  
Mohammed A. AlSaadi¹, Abdullah Al-Mamun¹, Saleyman Aremu Muyibi¹, Md Zahangir Alam¹, Is Sopyan¹, Yehya M. Ahmed¹ & Mutaz Ali Atieh²  
¹International Islamic University Malaysia, Malaysia.  
²King Fahd University of Petroleum and Minerals, Saudi Arabia. |
| 170 | Applying of New Technologies (Remote Sensing and GIS) in Flash Flood Disaster Management, Case Study: Undawanban Area, Khartoum State  
Eltaib Ganawa¹ & Khalid Abdalla².  
¹University of Khartoum, Sudan.  
²Ministry of Interior, Sudan. |
| 171 | Detection of Foreign Bodies in Canned Foods Using Ultrasonic Testing  
Mefta Hrairi & M.A. Elias.  
International Islamic University Malaysia, Malaysia. |
| 172 | Fingerprint Recognition in WiMAX Technology  
M. F. L. Abdallah¹ & Aws Z. Yonis².  
¹University Tun Hussein Onn Malaysia, Malaysia.  
²University of Mosul, Iraq. |
| 173 | Endo sensor – Bacterial Endotoxin Detector in Liquid Biological Samples.  
Akbar John, B.¹, Kamaruzzaman, Y.B.¹, Jalal, K.C.A.¹ & Zaleha, K.²  
¹International Islamic University Malaysia, Malaysia.  
²Universiti Malaysia Terengganu, Malaysia. |
| 114 | Enzymatic Hydrolysis of Oil Palm Empty Fruit Bunch Using Immobilized Cellulase Enzyme  
Rasha Mohammed Abd, Ma’an Al-Khatib*, M.D. Zahangir Alam, Hamzah Mohd. Saleh  
¹International Islamic University Malaysia, Malaysia. |
**Parallel Session: BEE 6 (Bioenvironmental Engineering)**

Chairperson: Ir. Zaki Zainuddin  
Co-chairperson: Assoc. Prof. Dr. Hamzah Mohd Salleh

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 150 | Adsorption of Heavy Metal from Landfill Leachate by Wasted Biosolids  
International Islamic University Malaysia, Malaysia. |
| 167 | Improvement of Die And Roller Changing Method of a Poultry Feed Processing Industry  
M. Iqbal¹, Salma A. Iqbal² & Md. Zahangir Alam³.  
¹Dept. of Industrial and Production Engineering, Sylhet-3114, Bangladesh.  
²Dept. of Chemical Engineering and Polymer Science, Sylhet-3114, Bangladesh.  
³International Islamic University Malaysia, Malaysia. |
| 168 | Biogas Recovery from Municipal Solid Waste in Bangladesh Using Anaerobic Digestion Technique  
Salma A. Iqbal & M. Iqbal.  
Shahjalal University of Science and Technology, Bangladesh. |
| 169 | Static Culture System for Mass Culture of Scenedesmus dimorphus in Boiled Fermentation Broth  
K. Balasupramaniam & K.B. Bujang.  
Universiti Malaysia Sarawak, Malaysia. |
| 18  | Solar-reflector Antennae as a Safe Energy Alternative (Part III): Calculations from Malaysian Data  
S. O. Bashir & Mohamed E. S. Mirghani.  
International Islamic University Malaysia, Malaysia. |
| 152 | In vitro Regeneration of Curculigo latifolia Through Shoot Tip Cultures  
Nahid Babaei, Nur Ashikin Psyquay Abdullah, Ghizan B. Saleh, Thohirah Lee Abdullah,  
Ali Ranjarfard  
Universiti Putra Malaysia, |

*ICBioE’11- 35*
### Parallel Session: BME 6 (Biomolecular Engineering)

**Chairperson:** Assoc. Prof. Dr. Irwandi Jaswir  
**Co-chairperson:** Assoc. Prof. Dr. Faridah Bt. Yusof

<table>
<thead>
<tr>
<th>ID</th>
<th>Title, Author(s) and Affiliation</th>
</tr>
</thead>
</table>
| 69 | Knowledge Based Systems for Man-made Disasters Management  
Nassereldeen A. Kabbashi, Mohammed Elwathig, & Nurhafizah Bt Ismail.  
International Islamic University Malaysia, Malaysia. |
| 30 | Investigating the Genomic Islands of *Magnetospirillum magneticum* AMB-1 and Evaluating Their Role in Environmental Fitness  
Ali Bin Thani¹, Essam Ghanem¹, Mohamed Bououdina²,³, Salwa Al-Thawadi¹, Ahmed Al-Saie²,³ & Suad Rashdan⁴.  
¹Department of Biology, ²Department of Physics, College of Science, University of Bahrain, ³Nano-technology Center, University of Bahrain, ⁴Department of Chemistry, College of Science, University of Bahrain, Kingdom of Bahrain. |
| 70 | Integrated Scheduled Waste Management System in Kuala Lumpur Using Expert System  
Nassereldeen A. Kabbashi, Mohammed Saedi, & Nur Adibah Md Azman.  
International Islamic University Malaysia, Malaysia. |
| 94 | Toward Strategic Green ICT Policy to Eliminate Environmental Problems  
Shihab A. Hameed & Othman O. Khalifa.  
International Islamic University Malaysia, Malaysia. |
| 104 | Computational Investigation on CSF Flow Analysis in the Third Ventricle and Aqueduct of Sylvius  
Edi Azali Hadzri¹, Ahmad Lufti Abdul Ghani¹, Amir Hamzah Shamsudin¹, Kahar Osman¹, Mohammed Rafiq Abdul Kadir¹ & Azian Abd Aziz².  
¹Universiti Teknologi Malaysia, Malaysia.  
²International Islamic University Malaysia, Malaysia. |
| 139 | Prediction of Anticancer Activity of Aliphatic Nitrosoureas Using Quantum Chemical QSAR Methods  
Noorbatcha, I. A., Hamzah, F., Salleh H. M. & Idid S. Z.  
International Islamic University Malaysia, Malaysia. |
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The courses are dedicated to promote training in a series of enabling technologies drawn from various field including microbiology, cell and molecular biology, genetics, biochemistry, fermentation, bioprocess, environmental biotechnology which allow one to synthesize, breakdown or transform biomaterials to suit human needs. The curriculum of this programme is designed to develop students with entrepreneurial values, creative, innovative and able to solve problems in the biotechnology engineering area.

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- Bioenvironmental Engineering
- Industrial Biotechnology Engineering

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ABSTRACTS