UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

ENVIRONMENTAL BIOTECHNOLOGY GROUP

RESEARCH REPORT

2020

FACULTY OF BIOTECHNOLOGY AND BIOMOLECULAR SCIENCES

contents

EB GROUP @ BIOREFINERY UPM 2020

Researchers
- 9 Principle Researchers
- 3 Postdoctoral Researchers
- 2 Research Assistants

EB GROUP MEMBERS

Students
- 19 PhD Students
- 16 MSc Students

RESEARCH INTEREST

01 Waste into Wealth

From	To
• Agricultural Waste • Sewage Sludge • Livestock Manure • Used cooking oil • Municipal waste • Landscaping Waste	Value Added Products • Bioenergy • Bioproduct • Biocompost • Biomaterials

02 Environmental Sustainability

- Profiling effects of agricultural & industrial activity on environment.
- Bacterial community study.

ULTIMATE GOAL

NATIONAL COLLABORATORS

INTERNATIONAL COLLABORATORS

EB Laboratories

INTRODUCTION

EB Group has two main facilities which are:

1. **Biorefinery Complex**
2. **Environmental Biotechnology Laboratory at Biotech 3**

1. BIOREFINERY COMPLEX

Biorefinery Complex of Environmental Biotechnology (EB) Group is the first pilot processing in UPM that incorporates a holistic approach in exploiting solid biomass into value added products through green technology approaches.

Biorefinery Complex was first operated in January 2014, and is located nearby University Agricultural Park (TPU) and UPM golf course. The whole area of Biorefinery Complex covers a parameter of approximately 1075 m^2. The facilities in Biorefinery complex include: **Pilot plant and Biomass Technology Laboratory (BTL).**

Pilot Plant

The EB pilot plant is designed and built mainly to conduct four projects (biocompost, biochar, biogas, and biodiesel), which are established based on our extensive research for 25 years in environmental biotechnology. It is majorly equipped with machinery for solid biomass and biocompost production.

Biomass Technology Laboratory (BTL)

The general facilities in BTL includes postgraduate students room which can accommodate around 30 students, researcher rooms, meeting room and seminar room (can accommodate 100 people at a time).

The laboratory comprises of a chemical room, a culture room, a bioreactor room, an analysis room and a cold room. It is fully equipped with instruments for environmental biotechnology research.

2. EB LABORATORY AT BIOTECH 3

Environmental Biotechnology (EB) Research Group has two laboratories located at Biotech 3: Environmental Biotechnology General Laboratory and Environmental Biotechnology Molecular Laboratory.

There are about 10 students (postgraduates and undergraduates) currently working in these laboratories. The Environmental Biotechnology General Laboratory is a facility mainly for research related to biopolymers, biomaterials and biochemicals. While, the molecular laboratory is dedicated for genetic and molecular work.

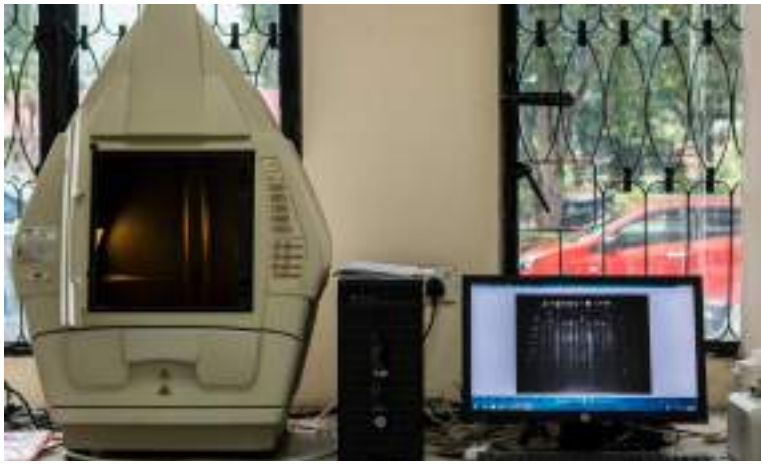
Equipment List

Environmental Biotechnology General Laboratory

i. Gas-chromatography with Flame Ionisation Detector (GC-FID)
ii. Gel Permeation Chromatography (GPC) with UV and RI Detectors
iii. High Performance Liquid Chromatography (HPLC)
iv. Thermogravimetric Analyser (TGA)
v. Freeze Dryer

Environmental Biotechnology Molecular Laboratory

i. PCR and RT-PCR Thermal Cycler
ii. Denaturing Gradient Gel Electrophoresis (DGGE)
iii. Flow Cytometer
iv. NanoDrop Spectrophotometer
v. Gel Documentation System



Message from EB Group Leader

Prof. Dato' Dr. Mohd Ali Hassan, FASc., FAPM.

In The Name of Allah, Most Gracious, Most Merciful.

Alhamdulillah, praise to Allah for His generous favours and blessings on us. First of all, I would like to thank the Almighty for guiding and leading us towards tremendous growth made by the Environmental Biotechnology Research Group UPM (EB Group). As the EB Group leader, I am glad to share our research report for 2020.

Our research has been focused on using renewable resources, particularly biomass from the oil palm industry for bioenergy, bioproduct, biomaterials and biofertilisers. By adopting green technology coupled with the zero-emission concept, our group has collaborated with many institutions locally and internationally for various projects, such as with Ministry of Housing and Local Government Malaysia (KPKT), Subang Jaya Municipal Council (MPSJ), Malaysian Agricultural Research and Development Institute (MARDI), Federal Land Development Authority (FELDA), SWCorp Malaysia, YPJ Holdings, Worldwide Landfill, Indah Water Consortium, Nextgreen Pulp & Paper Sdn. Bhd. (NgPP), AMPM Sdn. Bhd., Mitsubishi Heavy Industries and Materials, Universitas Indonesia, CJ Bio Malaysia Sdn. Bhd., Novozymes Malaysia, Korea University, Kyushu Institute of Technology (KyuTech) and Kanazawa Institute of Technology, Japan.

Our team consists of 9 principal researchers, 3 post-doctoral fellows, 19 PhD students, 16 Masters students and 2 Research Assistants. This year, 6 PhD students and 4 Masters students have completed their Viva Voce. In terms of output, despite the COVID-19 pandemic, we have successfully published 35 research papers in 2020, with 15 publications in Quartile 1 (Q1) and 15 publications in Quartile 2 (Q2), with a total impact factor of 125.686.

I appreciate the hard work of all EB members to uphold our culture of high success. The strong collaborations established between EB researchers with public and private agencies and other institutions across Malaysia and internationally will drive significant research discoveries. May Allah grant us the strength and wisdom to continue the good work and contribute to the growth of the university, the ummah, the nation and the environmental biotechnology field.

Thank you. Wassalam.

Prof. Dato' Dr. Mohd Ali Hassan, FASc., FAPM.

EB Group History

Environmental Biotechnology Research Group (EB Group) is a research group under the Faculty of Biotechnology and Biomolecular Sciences (FBSB), focusing mainly on conversion of sustainable and renewable bioresources into value-added green products. EB Group was founded and led by Prof. Dato' Dr. Mohd Ali Hassan in 2004 with the tagline of "Waste to Wealth through Biotechnology". EB Group has grown over the years, and at present, the group has 9 lecturers / researchers as full-time members with several associate members. Currently, there are over 30 postgraduate students working on various research areas including biocompost, biochar, biogas and biofuel, nanocellulose and biomaterials, biolubricant, and enzymes. EB Group has collaborated with several international research partners including from Japan, South Korea, Thailand and Indonesia. EB Group particularly, has a very close relationship with Kyushu Institute of Technology (Kyutech), Japan whereby it started back in 1998 when Prof. Dato' Dr. Mohd Ali Hassan initiated the collaboration with Prof. Dr. Yoshihito Shirai of Kyutech. This duo was entrusted by FELDA in 2002 to lead a big project on the utilisation of oil palm biomass for value-added products. The big amount of grant obtained through the project has contributed to the growth of the research and the establishment of EB Group. Since then, EB Group has succeeded in securing several big RDCI grants from local and international sources, namely MOSTI top-down TechnoFund, MTDC-CRDF grant and SATREPS. EB Group has also actively involved in local and international consultancy projects such as with Worldwide Landfill, Indah Water Konsortium Sdn. Bhd., YPJ Holdings, Nextgreen Pulp & Paper Sdn. Bhd., AMPM Sdn. Bhd., CJ Bio Malaysia Sdn. Bhd., Novozymes Malaysia., Mitsubishi Heavy Industries (Japan), Advanced Industrial Science and Technology (AIST Japan) and Ajinomoto Company Inc (Japan).

Alhamdulillah, EB Group members have published more than 200 scientific articles to date, commercialised some of the research findings, trained more than 100 human capital, and contributed to the community through knowledge transfer programmes. We will continue to be the leader in the Environmental Biotechnology research in Malaysia and in the a region. EB Group strives to contribute to the community and strengthen the bioeconomy through collaborations with public and private sectors, in line with the UN sustainable development goals (SDGs).

DEVELOPMENT OF EB GROUP RESEARCH FACILITIES

2020-2021
- Development of pre-commercialisation facilities for bionano composite production (funded by JST Japan under aXis project)

2018-2020
- Installation of Biogas Pilot Facility (SWCorp project – Kursi Tan Sri Ali Hamsa)

2013-2018
- Remote EB lab was developed at Keningau Palm Oil Mill under SATREPS project (JICA-JST-KPT grant)
- Development of Biochar Pilot Plant and installation of Nanocellulose Processing Facility at Biorefinery Complex UPM under SATREPS project

2012
- Biorefinery Complex UPM as the anchor for Serdang Biomass Town project. Installation of Biodiesel Pilot Facility under the project (supported by KPKT and MPSJ, in collaboration with Japan Government)

2011
- Biomass Technology Laboratory moved to Biorefinery Complex UPM

2008
- Development of Biocompost Pilot Plant at Biorefinery Complex UPM (supported by MTDC-CRDF grant)

2006-2007
- Establishment of Biomass Technology Laboratory at Block N1, MTDC UPM (supported by AIST & Ajinomoto grant) for main operation of EB Group.
- Some research activities are placed at EB lab in BioTech3

2005
- EB lab moved to Institute of Bioscience (IBS).
- Remote EB lab was developed at FELDA Serting Hilir Palm Oil Mill with Biogas Pilot Plant facilities (FELDA grant until 2008)

2004
- Establishment of Environmental Biotechnology Research Group (EB Group), operated at Faculty of Biotechnology and Biomolecular Sciences (FBSB) UPM.

EB
Big Picture

WASTE

TECHNOLOGY

Biological | Hydrothermal | Thermal | Physical | Green Chemicals

RESEARCH TOPICS

BIOCOMPOST

BIOMATERIALS

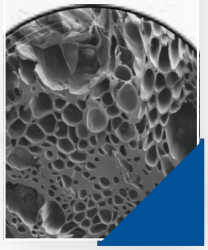
- Biopolymer
- Biocomposite
- Nanocellulose
- Paper

BIOFUEL, BIOCATALYSTS & BIOBASED CHEMICALS

- Biosugar
- Bioethanol
- Biobutanol
- Biodiesel
- Biosurfactant
- Enzyme

BIOCHAR & BIOADSORBENT

Wastewater treatment



ENVIRONMENTAL MICROBIOME

- Biomonitoring
- Bioremediation

EXPERTS

Prof. Dato' Dr. Mohd Ali Hassan
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Expertise

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Expertise

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Expertise

Dr. Ezyana Kamal Bahrin
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Expertise

EXPERTISE INDICATOR

- Biocompost
- Biomaterials
- Biofuel, Biocatalysts & Biobased Chemicals
- Biochar & Bioadsorbent
- Environmental Microbiome

Consultancy Project & Intellectual Property Filed

EB CONSULTANCY PROJECTS 2020

No.	Projects	Company	Duration of Project	Person In Charge
1	Use of Biosurfactant as Biofungicide in Controlling of Fungal Disease of Cucumber	SB Biz Sdn. Bhd.	3 months	Assoc. Prof. Dr. Mohd Rafein Zakaria
2	Use of Biosurfactant as Biofungicide of Fungal Disease of Rock Melon (MMT)	ALFI BIST ENTERPRISE	6 months	Assoc. Prof. Dr. Mohd Rafein Zakaria
3	Selangor Biotechnology Action Plan 2020-2030	Invest Selangor Berhad	6 months	Prof. Dato' Dr. Mohd Ali Hassan
4	Heavy Metal Testing using Microbes	Ken Microbes Biotech Sdn. Bhd.	6 months	Assoc. Prof. Dr. Mohamad Faizal Ibrahim
5	Determination of Phytase Activity using Pichia pastoris	Menon Nutrition Sdn. Bhd.	1 year	Assoc. Prof. Dr. Mohamad Faizal Ibrahim
6	One-Step Self-Sustained Low-Temperature Carbonisation Of Woodchips To Produce A Biochar-Derived Bioadsorbent Upm-Worldwide Landfills Sdn Bhd	WORLDWIDE LANDFILLS SDN BHD	1 year	Dr Mohd Zulkhairi Mohd Yusoff

INTELLECTUAL PROPERTY FILED, GRANTED AND LICENSED (PATENT AND COPYRIGHTS) 2020

No.	IP Category	Title	Copyright/ Patent No.
1	Filed	Portable Biodigester for Household Biogas Production	3 months

EB Members Participation 2020

CONFERENCE 2020

No.	Events	Date	Organizer	Participants
1	Reach & Remind Friends of the Industry Seminar 2020 & Dialogue	4/2/2020	MPOC	Prof. Dato' Dr. Mohd Ali Hassan
2	Asian Regional Conference on Systems Biology, ARCSB 2020	2 - 4/3/2020	Institute of Systems Biology (INBIOSIS), UKM.	Assoc. Prof. Dr. Mohamad Faizal Ibrahim
3	Konferen Webinar MSAE 2020	9/6/2020	Persatuan Jurutera Pertanian Dan Makanan Malaysia (MSAE)	Dr. Mohd Zulkhairi Mohd Yusoff
4	TAPPI Nano 2020 Virtual Conference	22-23/7/2020	TAPPI Nano Division	Prof. Ts. Dr. Hidayah Ariffin, Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Lawrence Ng Yee Foong, Liana Noor Megashah, Norhani Jusoh, Nur Sharmila Sharip, Farah Nabila Mhd Idris, Siti Shazra Shazleen Shamsudin
5	5th International Conference of Chemical Engineering and Industrial Biotechnology 2020 (ICCEIB2020)	9-11 /8/2020	Universiti Malaysia Pahang	Nur Liyana Mohd Izan
6	V-SMS2020-2nd Symposium on Multidisciplinary Science 2020	12/8/2020	Centre of Foundation Studies for Agricultural Science, UPM	Dr. Ezyana Kamal Bahrin
7	International Conference on Green And Renewable Energy 2020	18 - 19/8/2020	Universiti Putra Malaysia	Dr. Mohd Zulkhairi Mohd Yusoff
8	2nd Postgraduate Symposium on Industrial Science and Technology 2020 (SISTEC 2020)	26-27/8/2020	Universiti Malaysia Pahang	Nur Liyana Mohd Izan
9	The Society for Biotechnology, Japan Web Symposium 2020	3/9/2020	The Society for Biotechnology, Japan	Assoc. Prof. Dr. Norhayati Ramli
10	The 10th Annual International Conference on Environmental and Life Sciences	15-16/10/2020	Universitas Syiah Kuala, Banda Acheh, Indonesia.	Fatini Mat Arisah
11	5th Seminar on International Biology Conference (IBOC) 2020	17/10/2020	Sepuluh Nopember Institute of Technology (ITS), Surabaya, Indonesia	Prof. Dr. Suraini Abd-Aziz
12	11th International Greentech & Eco Products Exhibition & Conference Malaysia	19 - 23/10/2020	Malaysian Green Technology Corporation	Prof. Ts. Dr. Hidayah Ariffin, Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Lawrence Ng Yee Foong, Liana Noor Megashah
13	High Valuable Biorenewables (HVB) Network Online Conference	20 - 21/10/2020	The University of York, United Kingdom	Assoc. Prof. Dr. Mohd Rafein Zakaria
14	The 32nd Annual Meeting of the Thai Society for Biotechnology and International Conference (TSB 2020)	26-27/11/2020	Thai Society for Biotechnology (TSB)	Prof. Dr. Suraini Abd-Aziz
15	Symposium of Applied Engineering and Sciences 2020	12 -19/12/2020	Kyushu Institute of Technology (Kyutech) & Universiti Putra Malaysia (UPM)	EB Group Members

WEBINAR 2020

No.	Events	Date	Organizer	Participants
1	Electrospinning Webinar: Basics and Theory	27/4/2020	Progenelink	Dr. Farah Nadia Mohammad PadzilDr. Tengku Arisyah Tengku Yasim Anuar, Liana Noor Megashah, Nur Sharmila Sharip, Prof. Ts. Dr. Hidayah Ariffin
2	Webinar: Introducing an Advanced and Intuitive Multi-Omics Data Visualization System for Efficient Analysis and Discovery: 'Dr.Tom'	28/4/2020	BGI Genomics	Siti Suhailah Sharuddin
3	Nucleic Acid Purification: Basic and automation option	30/4/2020	Eppendorf	Fatini Mat Arisah
4	Maintenance and Column Care for Gas Chromatography	6/5/2020	IT Tech	Nur Sharmila Sharip
5	COVID-19 diagnostic workflow, Biocontainment Strategies: A Safe Lab, is a Safe You	14/5/2020	Eppendorf	Shobanah Menon Baskaran
6	Principle of Nano-indentation and In-situ Nano-mechanical Characterisation	20/5/2020	Bruker	Prof. Ts. Dr. Hidayah Ariffin, Dr. Tengku Arisyah Tengku Yasim Anuar, Nur Sharmila Sharip
7	Webinar Prior Art Search For Patent Using Free Websites: Lens, Patentscope, Espacenet & Myipo Online	22/5/2020	TNCPI Office	Dr. Mohd Zulkhairi Mohd Yusoff
8	Thin Film Interfacial Bonding and Tribological Characterizations by Nanoscratch	27/5/2020	Bruker	Prof. Ts. Dr. Hidayah Ariffin, Lawrence Ng Yee Foong
9	Thin Film Interfacial Bonding and Tribological Characterisation through Nanoscratch Analysis	27/5/2020	Bruker	Nur Sharmila Sharip
10	Principles and Applications of Nano-Dynamic Mechanical Analysis (nano-DMA)	3/6/2020	Bruker	Dr. Tengku Arisyah Tengku Yasim Anuar, Lawrence Ng Yee Foong, Nur Sharmila Sharip
11	Nanotech talk 2020: Gain public trust in your nano-based products	8/6/2020	NanoMalaysia	Liana Noor Megashah
12	High Speed Property Mapping and Advanced Statistical Analysis (TribolQ)	11/6/2020	Bruker	Lawrence Ng Yee Foong, Nur Sharmila Sharip
13	Re-examining Teaching and Learning in Challenging Times: What are our assessment options?	11/6/2020	NUS, Singapore	Assoc. Prof. Dr. Mohd Rafein Zakaria
14	HPLC Column Care and Storage	11/6/2020	Phenomenex	Shobanah Menon Baskaran
15	Plastics Recycling: Insights, Challenges and Future Trends	19/6/2020	Perkin Elmer	Prof. Ts. Dr. Hidayah Ariffin, Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Lawrence Ng Yee Foong, Nur Sharmila Sharip, Siti Shazra Shazleen Shamsudin
16	Webinar: The Complete Guide to RNA Sequencing: Everything You Ever Wanted to Know for Successfull RNA Sequencing Based Research	23/6/2020	BGI Genomics	Siti Suhailah Sharuddin
17	Material Reverse Engineering with Multiple Hyphenation Analytical Techniques: An Overview of Comprehensive Polymer Testing	30/6/2020	Perkin Elmer	Siti Shazra Shazleen Shamsudin
18	Webinar on Blockchain (Series 1): Building Resilience with Blockchain for a Sustainable Malaysia's Agriculture	2/7/2020	FCSIT, UPM	Dr. Ezyana Kamal Bahrin
19	Current Activities in Measuring Size Distributions of Cellulose Nanomaterials Webinar	19/8/2020	TAPPI Nano Division	Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Norhani Jusoh, Siti Shazra Shazleen Shamsudin

WEBINAR 2020 - cont.

No.	Events	Date	Organizer	Participants
20	Bio Incheon Global Conference 2020 (Big C 2020)	25/8/2020	Asian Federation of Biotechnology & Incheon Tourism Organization	Prof. Dr. Suraini Abd-Aziz, Assoc. Prof. Dr. Mohamad Faizal Ibrahim
21	Surface Area and Particle Size Distribution (SAPSID 3.0)	3/9/2020	Institute of Advanced Technology (ITMA), UPM	Lawrence Ng Yee Foong
22	Webinar: Your Research Story: Creating Visualisations to Increase Research Impact	10/9/2020	Wiley Research APAC Webinars	Nur Liyana Mohd Izan
23	Turning the Downward Spiral Upwards: How Circular Economy is Putting Pressure on the Waste Recycling Industry	10/9/2020	International Solid Waste Association (ISWA)	Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Siti Shazra Shazleen Shamsudin
24	Program Bicara Penyelidikan: Perkongsian Penulisan Usulan Penyelidikan Geran SATREPS	18/9/2020	Kluster Penyelidikan Sumber Lestari Alam Sekitar dan Kehidupan Pintar, Pusat IDEA UKM	Prof. Dato' Dr. Mohd Ali Hassan
25	Biodegradable Face Mask & Environmental Sustainability: A Future Perspective	18/9/2020	Malaysia One Health University Network (MyOHUN)	Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar, Liana Noor Megashah
26	Multi-year policy dialogue on innovative waste management	6 - 7/10/2020	SWCopr and KPKT	Assoc. Prof. Dr. Mohd Rafein Zakaria, Dr. Mohd Zulkhairi Mohd Yusoff
27	Progress in Biomass Conversion Technologies	7/10/2020	Universiti Teknologi Petronas	Assoc. Prof. Dr. Mohd Rafein Zakaria
28	Importance of Research in Education & its Current Trends	7/10/2020	Academic & Research Management Division, UPMKB	Nurul Sabrena Hanafi
29	Troubleshooting SPE & Other Sample Prep Techniques - APAC	7/10/2020	Phenomenex	Shobanah Menon Baskaran
30	From Nucleic Acid Purification to Downstream Applications – Optimize Your Workflow!	20/10/2020	Eppendorf	Fatini Mat Arisah
31	Malaysia Biomass Industries Webinar 2020	22/10/2020	MBIC, MGTC & EPIC	Dr. Mohd Zulkhairi Mohd Yusoff
32	Asian Federation of Biotechnology (AFOB) International Symposium	23/10/2020	AFOB & Korean Society for Biotechnology and Bioengineering (KSBB)	Prof. Dr. Suraini Abd-Aziz
33	International Webinar 2020	4/11/2020	Department of Land Management, Faculty of Agriculture, UPM	Abubakar Abdullahi Lawal, Mohd Hafif Samsudin, Mohd Idham Hakimi Razali
34	Natural Fibre Composites and Use of Agrowaste as Filler	4/11/2020	Institute of Tropical Forestry and Forest Products (INTROP), UPM	Dr. Farah Nadia Mohammad Padzil, Dr. Tengku Arisyah Tengku Yasim Anuar
35	Putra Plantation Forum Ke-10	9/12/2020	Institut Kajian Perladangan	EB Group Members

WORKSHOP 2020

No.	Events	Date	Organizer	Participants
1	Bengkel Putrablast v3.0	3/2/2020	Fakulti Bioteknologi dan Sains Biomolekul	Prof. Ts. Dr. Hidayah Ariffin
2	Bengkel Latihan Panel Penilai Dana KPM	5/2/2020	Research Management Centre, UPM	Prof. Ts. Dr. Hidayah Ariffin
3	Bengkel Wawasan Kemakmuran bersama APM	6/2/2020	Kementerian Pengajian Malaysia	Prof. Dato' Dr. Mohd Ali Hassan
4	EB Writing Workshop	27/3/2020	BTC	EB Group Members
5	Scientific Writing Workshop "Tips to Publish in High Impact Journal	19/5/2020	Institute of Tropical Forestry and Forest Products (INTROP), UPM	Prof. Ts. Dr. Hidayah Ariffin, Dr. Farah Nadia Mohammad Padzil, Lawrence Ng Yee Foong, Liana Noor Megashah, Norhani Jusoh, Nur Sharmila Sharip, Nurul Ain Abu Bakar, Farah Nabila Mhd Idris, Siti Shazra Shazleen Shamsudin
6	Online Seminar. Improving Academic Writing Skills in Publishing High Impact Journal	11/6/2020	Faculty of Engineering and Institute of Tropical Forestry and Forest Products (INTROP), UPM	Norhani Jusoh
7	Online Seminar: Improving Academic Writing Skills in Publishing High Impact Journals	11/6/2020	Faculty of Engineering, UPM	Nur Liyana Mohd Izan
8	Researcher Online Forum: Publishing in Southeast Asia	16/6/2020	APAC Library Springer Nature	Siti Shazra Shazleen Shamsudin
9	Publication in a Scientific Journal	24/7/2020	Faculty of Forestry and Environment, UPM	Mohamed Abdillah Ahmad Farid
10	Selangor Biotechnology Action Plan 2020-2030 Stakeholders Workshop	5/8/2020	UPM-MABIC	Prof. Ts. Dr. Hidayah Ariffin, Assoc. Prof. Dr. Norhayati Ramli, Dr. Ezyana Kamal Bahrin
11	Emergency Response Training on Public Health Emergencies of Covid-19 to University Emergency Response Team Members	NA	Occupational Safety and Health Management Office, Universiti Putra Malaysia	Dr. Ahmad Muhaimin Roslan
12	Bengkel Latihan Penilai Dalaman Swakreditasi	8/9/2020	NA	Prof. Ts. Dr. Hidayah Ariffin
13	Writing Workshop: English Grammar and Punctuation are Important to avoid Paper Rejection	22/9/2020	Research Management Centre, UPM	Dr. Mohd Zulkhairi Mohd Yusoff
14	DECOTA Airlangga Global Scholars (AGS) program	9 and 23/10/2020	Universitas Airlangga, Surabaya, Indonesia	Prof. Dr. Suraini Abd-Aziz
15	Life Cycle Assessment Analysis Workshop	5-6/10/2020	SIRIM Sdn. Bhd.	Prof. Ts. Dr. Hidayah Ariffin, Dr. Mohd Zulkhairi Mohd Yusoff
16	59th International Congress and Convention Association (ICCA) 2020	1-3/11/2020	ICCA	Prof. Dr. Suraini Abd-Aziz

List of Publication 2020

JOURNAL

No.	Article Title	Journal Name	Impact Factor
1	Production of biochar from oil palm frond by steam pyrolysis for removal of residual contaminants in palm oil mill effluent final discharge *Abubakar Abdullahi Lawal, Mohd Ali Hassan, Mohamed Abdillah Ahmad Farid, Tengku Arisyah Tengku Yasim-Anuar, Mohd Zulkhairi Mohd Yusoff, Mohd Rafein Zakaria, Ahmad Muhaimin Roslan, Mohd Noriznan Mokhtar, Yoshihito Shirai*	Journal of Cleaner Production	7.246 (Q1)
2	Carbon monoxide reduction in the flue gas during biochar production from oil palm empty fruit bunch *Mohammed Abdillah Ahmad Farid, Mohd Ali Hassan, Ahmad Muhaimin Roslan, Mohd Hafif Samsudin, Zarry Jay Jay Mohamad, Mohd Ridzuan Othman, Yoshihito Shirai*	Journal of Cleaner Production	7.246 (Q1)
3	Convective sludge drying by rotary drum dryer using waste steam for palm oil mill effluent treatment *Mohammed Abdillah Ahmad Farid, Ahmad Muhaimin Roslan, Mohd Ali Hassan, Farhana Aziz Ujang, Zarry Mohamad, Muhamad Yusuf Hasan, Yoshihito Shirai*	Journal of Cleaner Production	7.246 (Q1)
4	Toxicity identification and evaluation of palm oil mill effluent and its effects on the planktonic crustacean *Daphnia magna* *Yuya Hashiguchi, Mohd Rafein Zakaria, Toshinari Maeda, Mohd Zulkhairi Mohd Yusoff, Mohd Ali Hassan, Yoshihito Shirai*	Science of The Total Environment	6.551 (Q1)
5	Biochar enhanced the nitrifying and denitrifying bacterial communities during the composting of poultry manure and rice straw *Mohd Huzairi Zainudin, Nurul Asyifah Mustapha, Toshinari Maeda, Norhayati Ramli, Kenji Sakai, Mohd Ali Hassan*	Waste Management	5.448 (Q1)
6	Combined optimisation of codon usage and glycine supplementation enhances the extracellular production of a β-Cyclodextrin Glycosyltransferase from *Bacillus sp.* NR5 UPM in *Escherichia coli* *Nik Ida Mardiana Nik-Pa, Mohamad Farhan Mohamad Sobri, Suraini Abd-Aziz, Mohamad Faizal Ibrahim, Ezyana Kamal Bahrin, Noorjahan Banu Mohammed Alitheen, Norhayati Ramli*	International Journal of Molecular Sciences	4.556 (Q1)
7	In-Silico characterisation of Glycosyl Hydrolase Family 1 β-Glucosidase from *Trichoderma asperellum* UPM1 *Mohamad Farhan Mohamad Sobri, Suraini Abd-Aziz, Farah Diba Abu Bakar, Norhayati Ramli*	International Journal of Molecular Sciences	4.556 (Q1)
8	*Alcaligenaceae* and *Chromatiaceae* as pollution bacterial bioindicators in palm oil mill effluent (POME) final discharge polluted rivers *Nurhasliza Zolkefli, Norhayati Ramli, Noor Shaidatul Lyana Mohamad-Zainal, Nurul Asyifah Mustapha, Mohd Zulkhairi Mohd Yusoff, Mohd Ali Hassan, Toshinari Maeda*	Ecological Indicators	4.229 (Q1)
9	Modification of cellulose degree of polymerisation by superheated steam treatment for versatile properties of cellulose nanofibril film *Liana Noor Megashah, Hidayah Ariffin, Mohd Rafein Zakaria, Mohd Ali Hassan, Yoshito Ando, Farah Nadia Mohammad Padzil*	Cellulose	4.210 (Q1)
10	The effect of palm oil mill effluent final discharge on the characteristics of *Pennisetum purpureum* *Nurul Atiqah Osman, Farhana Aziz Ujang, Ahmad Muhaimin Roslan, Mohamad Faizal Ibrahim, Mohd Ali Hassan*	Scientific Reports	3.998 (Q1)

JOURNAL - cont.

No.	Article Title	Journal Name	Impact Factor
11	A highly thermostable crude endoglucanase produced by a newly isolated *Thermobifida fusca* strain UPMC 901 *Mohd Huzairi Mohd Zainudin, Nurul Asyifah Mustapha, Mohd Ali Hassan, Ezyana Kamal Bahrin, Mitsunori Tokura, Hisashi Yasueda, Yoshihito Shirai*	Scientific Reports	3.998 (Q1)
12	Mechanism of carbon partitioning towards starch and triacylglycerol in *Chlorella vulgaris* under nitrogen stress through whole-transcriptome analysis *Norazela Nordin, Norjan Yusof, Toshinari Maeda, Nurul Asyifah Mustapha, Mohd Zulkhairi Mohd Yusoff, Raja Farhana Raja Khairuddin*	Biomass and Bioenergy	3.551 (Q1)
13	Palm oil mill final discharge treatment by a continuous adsorption system using oil palm kernel shell activated carbon produced from two-in-one carbonisation activation reactor system *Nahrul Hayawin Zainal, Mohamad Faizal Ibrahim, Nor Faizah Jalani, Ropandi Mamat, Astimar Abdul Aziz, Noorshamsiana A.W., Suraini Abd-Aziz*	Journal of Water Process Engineering	3.465 (Q1)
14	Mechanical strength, thermal conductivity and electrical breakdown of kenaf core fibre/lignin/polypropylene biocomposite *Harmaen Ahmad Saffian, Mohd Aizam Talib, Seng Hua Lee, Paridah Md Tahir, Ching Hao Lee, Hidayah Ariffin, Ainun Zuriyati Mohamed Asa'ari*	Polymers	3.426 (Q1)
15	Well-dispersed cellulose nanofibre in low density polyethylene nanocomposite by liquid-assisted extrusion *Tengku Arisyah Tengku Yasim-Anuar, Hidayah Ariffin, Mohd Nor Faiz Norrrahim, Mohd Ali Hassan, Yoshito Ando, Takayaki Tsukegi, Haruo Nishida*	Polymers	3.426 (Q1)
16	Highly efficient removal of diazinon pesticide from aqueous solutions by using coconut shell-modified biochar *Nor Atikah Baharum, Hanisah Mohmad Nasir, Mohd Yusoff Ishak, Noorain Mohd Isa, Mohd Ali Hassan, Ahmad Zaharin Aris*	Arabian Journal of Chemistry	4.762 (Q2)
17	Effect of synthesis temperature on the size of ZnO nanoparticles derived from pineapple peel extract and antibacterial activity of ZnO–starch nanocomposite films *Hasbullah Hassan Basri, Rosnita A. Talib, Rashidah Sukor, Siti Hajar Othman, Hidayah Ariffin*	Nanomaterials	4.324 (Q2)
18	Net energy and techno-economic assessment of biodiesel production from waste cooking oil using a semi-industrial plant: A Malaysia perspective *Mohammed Abdillah Ahmad Farid, Ahmad Muhaimin Roslan, Mohd Ali Hassan, Muhamad Yusuf Hasan, Mohd Ridzuan Othman, Yoshihito Shirai*	Sustainable Energy Technologies and Assessments	3.427 (Q2)
19	One-step steam pyrolysis for the production of mesoporous biochar from oil palm frond to effectively remove phenol in facultatively treated palm oil mill effluent *Abubakar Abdullahi Lawal, Mohd Ali Hassan, Mohammed Abdillah Ahmad Farid, Tengku Arisyah Tengku Yasim-Anuar, Mohd Zulkhairi Mohd Yusoff, Mohd Rafein Zakaria, Ahmad Muhaimin Roslan, Mohd Noriznan Mokhtar, Yoshihito Shirai*	Environmental Technology & Innovation	3.356 (Q2)
20	Process optimisation of ultra-high molecular weight polyethylene/cellulose nanofibre bionanocomposites in triple screw kneading extruder by response surface methodology *Nur Sharmila Sharip, Hidayah Ariffin, Yoshito Ando, Yuki Shirosaki, Ezyana Kamal Bahrin, Mohammad Jawaid, Paridah Md Tahir, Nor Azowa Ibrahim*	Molecules	3.267 (Q2)
21	Potential of *Jatropha curcas L.* as biodiesel feedstock in malaysia: A concise review *Nurul Husna Che Hamzah, Nozieana Khairuddin, Bazlul Mobin Siddique, Mohd Ali Hassan*	Processes	2.753 (Q2)
22	Isolation, identification, and optimisation of γ-Aminobutyric Acid (GABA)-producing *Bacillus cereus* strain KBC from a commercial soy sauce *moromi* in submerged-liquid fermentation *Wan Abd Al Qadr Imad Wan-Mohtar, Mohamad Nor Azzimi Sohedein, Mohamad Faizal Ibrahim, Safuan Ab Kadir, Ooi Poh Suan, Alan Wong Weng Loen, Soumaya Sassi, Zul Ilham*	Processes	2.753 (Q2)

JOURNAL - cont.

No.	Article Title	Journal Name	Impact Factor
23	Effects of alginate and chitosan on activated carbon as immobilisation beads in biohydrogen production *Nur Farahana Dzul Rashidi, Nur Syakina Jamali, Siti Syazwani Mahamad, Mohamad Faizal Ibrahim, Norhafizah Abdullah, Siti Fatimah Ismail, Shamsul Izhar Siajam*	Processes	2.753 (Q2)
24	Biovanillin: production concepts and prevention of side product formation *Ahmed Ibrahim Galadima, Madihah Md Salleh, Huszalina Hussin, Chun Shiong Chong, Adibah Yahya, Shaza Eva Mohamad, Suraini Abd-Aziz, Nor Nadiah Mohamad Yusof, Muhammad Abu Naser, Amir Feisal Merican Al-Junid*	Biomass Conversion and Biorefinery	2.602 (Q2)
25	Durability of superheated steam-treated light red meranti (*Shorea spp.*) and kedondong (*Canarium spp.*) wood against white rot fungus and subterranean termite *Rasdianah Dahali, Seng Hua Lee, Zaidon Ashaari, Edi Suhaimi Bakar, Hidayah Ariffin, Pui San Khoo, Paiman Bawon, Qamariah Norhidayah Salleh*	Sustainability	2.576 (Q2)
26	A review of technical and economic aspects biomass briquetting *Sunday Yusuf Kpalo, Mohamad Faiz Zainuddin, Latifah Abd Manaf, Ahmad Muhaimin Roslan*	Sustainability	2.576 (Q2)
27	Production and characterisation of hybrid briquettes from corncobs and oil palm trunk bark under a low-pressure densification technique *Sunday Yusuf Kpalo, Mohamad Faiz Zainuddin, Latifah Abd Manaf, Ahmad Muhaimin Roslan*	Sustainability	2.576 (Q2)
28	A review of current and emerging approaches for water pollution monitoring *Nurhasliza Zolkefli, Siti Suhailah Sharuddin, Mohd Zulkhairi Mohd Yusoff, Mohd Ali Hassan, Toshinari Maeda, Norhayati Ramli*	Water	2.544 (Q2)
29	Enhanced volatile fatty acid production from sago hampas by *Clostridium beijerinckii* SR1 for bioelectricity generation using microbial fuel cells *Mohd Azwan Jenol, Mohamad Faizal Ibrahim, Ezyana Kamal Bahrin, Suraini Abd-Aziz*	Bioprocess and Biosystems Engineering	2.419 (Q2)
30	Simultaneous pretreatment and saccharification of oil palm empty fruit bunch using laccase-cellulase cocktail *Ruqayyah Masran, Ezyana Kamal Bahrin, Mohamad Faizal Ibrahim, Lai-Yee Phang, Suraini Abd-Aziz*	Biocatalysis and Agricultural Biotechnology	2.140 (Q2)
31	Efficient feeding strategy to enhance the start-up of anaerobic ammonium oxidation process in an anaerobic up-flow biofilm column reactor *Mumtazah Ibrahim, Norjan Yusofa, Hanisom Abdullah, Mohd Zulkhairi Mohd Yusoff, Mohd Ali Hassan*	Desalination and Water Treatment	0.854 (Q4)
32	Reduction of the acidity and peroxide numbers of tengkawang butter (*Shorea stenoptera*) using thermal and acid activated bentonites *Muhammad Arif Darmawan, Bagas Zaki Muhammad, Andre Fahriz Perdana Harahap, Muhammad Yusuf Arya Ramadhan, Muhammad Sahlan, Haryuni, Teguh Supriyandi, Suraini Abd-Aziz, Misri Gozan*	Heliyon	Scopus cited
33	Potential use of *Pennisetum purpureum* for phytoremediation and bioenergy production: A mini review *Nurul Atiqah Osman, Ahmad Muhaimin Roslan, Mohamad Faizal Ibrahim, Mohd Ali Hassan*	Asia-Pacific Journal of Molecular Biology and Biotechnology Vol. 28(1): 14-26	Scopus cited

BOOK CHAPTER

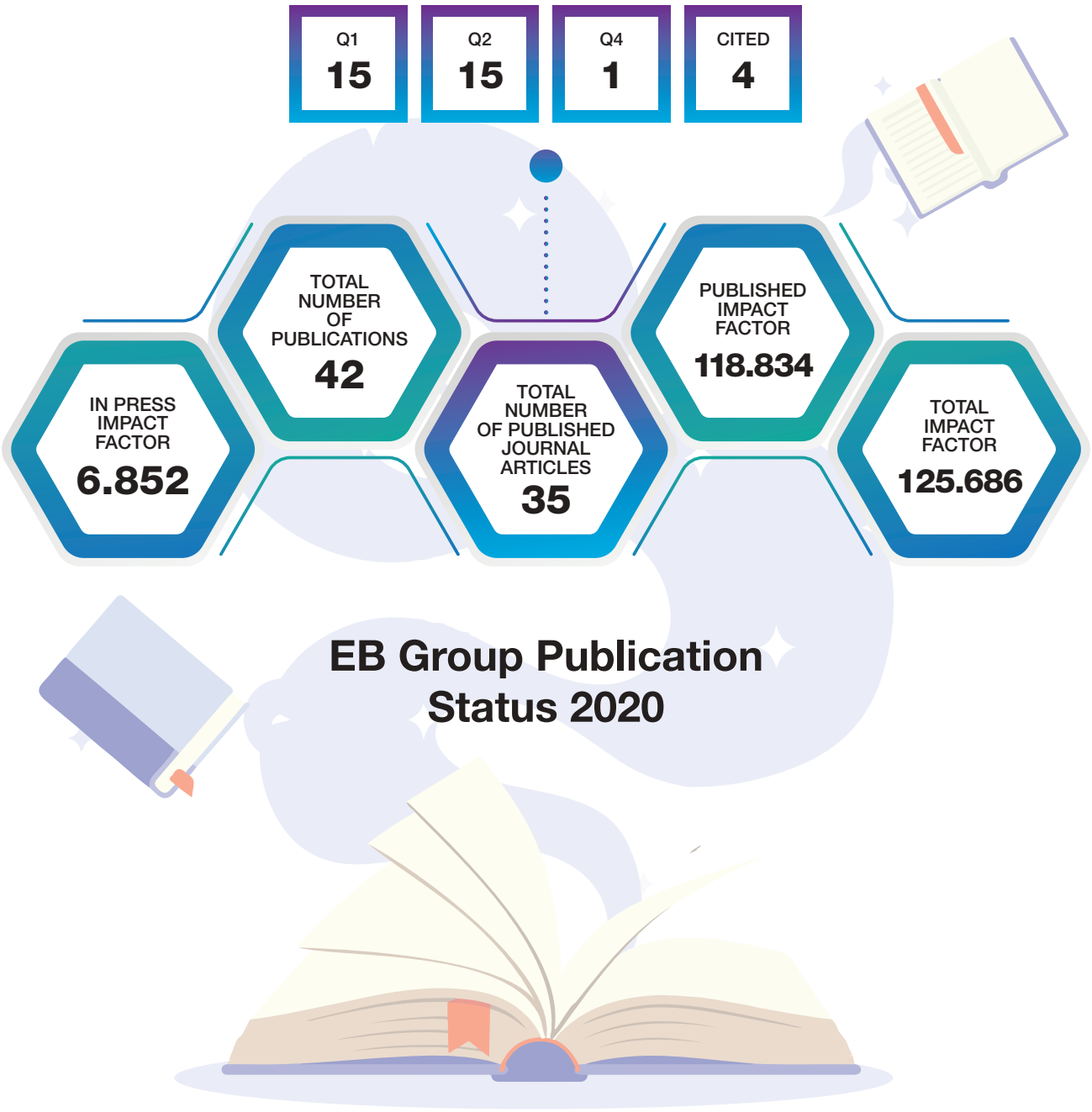
No.	Article Title	Journal Name	Impact Factor
1	Chemical, physical and biological treatments of pineapple leaf fibres *Farah Nadia Mohammad Padzil, Ainun Zuriyati Mohamed, Naziratulasikin Abu Kassim, Seng Hua Lee, Lee Ching Hao, Hidayah Ariffin, Edi Syams Zainudin*	Green Energy and Technology	5
2	A review on nanocellulose composites in biomedical application *Nur Sharmila Sharip, Tengku Arisyah Tengku Yasim-Anuar, Mohd Nor Faiz Norrrahim, Siti Shazra Shazleen, Mohd Nurazzi Norizan, SM Sapuan, RA Ilyas*	Composites in Biomedical Applications	8
3	Antimicrobial studies on food packaging materials *Mohd Nor Faiz Norrrahim, SM Sapuan, Tengku Arisyah Tengku Yasim-Anuar, Farah Nadia Mohammad Padzil, Nur Sharmila Sharip, Lawrence Yee Foong Ng, Liana Noor Megashah, Siti Shazra Shazleen, Noor Farisha Abd Rahim, R Syafiq, RA Ilyas*	Food Packaging: Advanced Materials, Technologies, and Innovations	5
4	Nanocellulose/starch biopolymer nanocomposites: Processing, manufacturing, and applications *RA Ilyas, SM Sapuan, Mohd Nor Faiz Norrrahim, Tengku Arisyah Tengku Yasim-Anuar, Abudukeremu Kadier, Mohd Sahaid Kalil, MSN Atikah, Rushdan Ibrahim, Mochamad Asrofi, Hairul Abral, A Nazrin, R Syafiq, HA Aisyah, MRM Asyraf*	Advanced Processing, Properties, and Applications of Starch and Other Bio-Based Polymers	6
5	Biobutanol production from agricultural biomass *Nurul Haziqah Alias, Mohamad Faizal Ibrahim, Muhammad Siddiq Mohamed Salleh, Mohd Azwan Jenol, Suraini Abd-Aziz, Lai Yee Phang*	Sustainable Bioeconomy: Pathways to Sustainable Development Goals	4

PROCEEDING/CONFERENCE

No.	Article Title	Proceeding/Conference Name
1	Production of a bioadsorbent from oil palm kernel shell, and application for pollutants and colour removal in palm oil mill effluent final discharge *Nahrul Hayawin Zainal, Mohamad Faizal Ibrahim, H. Kamarudin, Nor Faizah Jalani, Ropandi Mamat, Astimar Abdul Aziz, Suraini Abd-Aziz*	IOP Conference Series: Materials Science and Engineering
2	Economic evaluation of thermochemical conversion for rice straw-based second-generation bioethanol production in West Java *Andre Fahriz Perdana Harahap, Muhammad Yusuf Arya Ramadhan, Muhammad Sahlan, H Hermansyah, Ahmad Muhaimin Roslan, Misri Gozan*	IOP Conference Series: Earth and Environmental Science

IN PRESS

No.	Article Title	Journal Name	Impact Factor
1	Melt vs. non-melt blending of complexly processable ultra-high molecular weight polyethylene/ cellulose nanofibre bionanocomposite *Nur Sharmila Sharip, Hidayah Ariffin, Tengku Arisyah Tengku Yasim-Anuar, Yoshito Ando, Mohammad Jawaid, Paridah Md Tahir, Nor Azowa Ibrahim*	Polymers	3.426 (Q1)
2	Functionality of cellulose nanofibre as bio-based nucleating agent and nano-reinforcement material to enhance crystallisation and mechanical properties of polylactic acid nanocomposite *Siti Shazra Shazleen, Tengku Arisyah Tengku Yasim-Anuar, Nor Azowa Ibrahim, Mohd Ali Hassan, Hidayah Ariffin*	Polymers	3.426 (Q1)


Q1
15
Q2
15
Q4
1
CITED
4
IN PRESS IMPACT FACTOR
6.852
TOTAL NUMBER OF PUBLICATIONS
42
TOTAL NUMBER OF PUBLISHED JOURNAL ARTICLES
35
PUBLISHED IMPACT FACTOR
118.834
TOTAL IMPACT FACTOR
125.686
EB Group Publication Status 2020

Highlight

PROMOTION TO PROFESSOR - PROF. TS. DR. HIDAYAH ARIFFIN

Prof. Ts. Dr. Hidayah Ariffin
Department of Bioprocess Technology
Faculty of Biotechnology and Biomolecular Sciences
Universiti Putra Malaysia
Email: hidayah@upm.edu.my

- **Bac. Engineering (Process and Food), UPM**
- **MSc (Bioprocess Engineering), UPM**
- **PhD (Environmental Engineering), Kyutech, Japan**

2006	2009	2014	2015	2016	2018	2020
Tutor	Senior Lecturer	Innovation Coordinator FBSB	Head of Lab INTROP	Assoc. Professor	Deputy Director INTROP	Professor

Scopus *h*-index **21**, Citations **1276** | **Google Scholar** *h*-index **26**, Citations **2208**

99 PUBLICATIONS

- **75** Cited Journal Articles (75% in Q1/Q2)
- **6** Non-cited Journal Articles
- **1** Edited Book
- **8** Book Chapters
- **9** Scopus-cited proceedings

AUTHORSHIP
75 CIJ

30 RESEARCH GRANTS

- **3** International (1 PI, 2 Co)
- **27** National (14 PI, 13 Co)

PROJECT VALUE:
PI: RM7.34 million
Co: RM19.3 million

9 CONSULTANCY PROJECTS

- **3** International (2 PI, 2 Co)
- **6** National (1 PI, 5 Co)

PROJECT VALUE:
PI: RM734,000
Co: RM1.19 million

8 INTELECTUAL PROPERTIES

- **6** Patents
- **2** Copyrights

2 COMMERCIALISATION PARTNERS:
Nextgreen Pulp & Paper Sdn. Bhd.
ZoepNano Sdn. Bhd. (Innohub)
(Commercialisation value to date: RM550,000) - Nanocellulose

VISIBILITY

International
- Editorial Board Member, Journal of Renewable Materials (ISI WOS-indexed, Q3)
- Editor, Asian Federation of Biotechnology (AFOB) Newsletter
- Scientific Committee, International Symposium on Nanocellulosic Materials
- Advisory Committee, International Symposium on Advanced Materials and Nanotechnology
- 1 Plenary Lecture
- 1 Keynote Speaker
- 5 Invited Speaker

National
- Editor, ASM Science Journal (Scopus-indexed)
- MOE grants Evaluation Panel
- MOSTI EXpert Member, Development of National Nanotechnology Roadmap and Action Plan
- Invited Speaker, National Nanotechnology Centre Colloquium MOSTI

SUPERVISION

10 PhD as Chairman
- 5 graduated
- 5 active

8 MS as Chairman
- 6 graduated
- 2 active

9 PhD as Co-SV
- 4 graduated
- 5 active

11 MS as Co-SV
- 8 graduated
- 3 active

Media

MINGGUAN WANITA, **15th JANUARY 2020**. Dr. Ahmad Muhaimin as panel session for topic on used of cooking oil or "Kitar Semula Minyak Masak". Refer: https://www.mingguanwanita.my/minyak-masak-terpakai-pun-boleh-jana-pendapatan-mak-mak-jangan-buang/

SINAR HARIAN, 16th JANUARY 2020 in e-Trend section reported one of Prof. Ts. Dr. Hidayah Ariffin's project with news title, "Teknologi Nanoselulosa Universiti Tempatan Setanding Negara Maju".

Awards

Assoc. Prof. Dr. Norhayati Ramli received DaSilva award 2020 and research grant of JPY 300,000.00 by the Society for Biotechnology, Japan with research title "Development of Value-added Products Process from Palm Oil Waste and Monitoring of Bacterial Indicators for Environmental Assessment towards Sustainable Palm Oil Industry".

Prof. Dato' Dr. Mohd Ali Hassan has been awarded as one of the world top 2% scientists 2020 by Stanford University


SAES2020 The 8th UPM &Kyutech International
Symposium on Applied Engineering and Sciences

BEST POSTER
AWARD

Presented to

Liana Noor Megashah

For your contribution

"Energy efficient, higher productivity nanocellulose processing by regulating the cellulose degree of polymerization"

Prof. Dr. MITANI Yasunori, General Chair of SAES2020
Senior Executive Vice President, Kyushu Institute of Technology

Liana Noor Megashah received the best poster award in SAES2020 with the presentation title "Energy Efficient, Higher Productivity Nanocellulose Processing by Regulating The Cellulose Degree of Polymerisation"


SAES2020 The 8th UPM &Kyutech International Symposium on Applied Engineering and Sciences

BEST POSTER AWARD

Presented to

NUR SHARMILA SHARIP

For your contribution

"Improved mechanical-tribological properties and cytocompatibility evaluation of ultra-high molecular weight polyethylene/cellulose nanofiber bio-nanocomposites"

Prof. Dr. MIYANI Yasunori, General Chair of SAES2020
Senior Executive Vice President, Kyushu Institute of Technology


UPM

Certificate of Award

NUR SHARMILA SHARIP
(GS61288)

1ST PLACE

INTROP POSTGRADUATE OPEN DAY 2020
RESEARCH POSTER COMPETITION

Institute of Tropical Forestry and Forest Products
(INTROP)

29 December 2020

Nur Sharmila Sharip

Received the best poster award in SAES2020 with the presentation title "Improved Mechanical-tribological Properties & Cytocompatibility Evaluation of Ultra-high Molecular Weight Polyethylene/Cellulose Nanofibre Bio-nanocomposites"; and

1st runner up in INTROP Postgraduate Open Day 2020 Research Poster Competition with the presentation title "Improved Mechanical-tribological Properties & Cytocompatibility Evaluation of Ultra-high Molecular Weight Polyethylene/Cellulose Nanofibre Bio-nanocomposites"


UPM

Certificate of Award

SITI SHAZRA SHAZLEEN SHAMSUDIN
(GS51350)

1ST PLACE

INTROP POSTGRADUATE OPEN DAY 2020
RESEARCH POSTER COMPETITION

Institute of Tropical Forestry and Forest Products
(INTROP)

29 December 2020

Siti Shazra Shazleen Shamsudin received the 1st place in INTROP Postgraduate Open Day 2020 Research Poster Competition with the presentation title "Nucleation Effect of Cellulose Nanofibre on Crystallisation Behaviours and Kinetics of Polylactic Acid Biopolymer "

EB Student Research Summary

Abubakar Abdullahi Lawal | PhD (Agricultural Waste Engineering)
abubakar.lawal@unimaid.edu.ng | Supervisor: Prof. Dato' Dr. Mohd Ali Hassan

PhD STUDENT

One-step steam pyrolysis for production of mesoporous biochar from oil palm frond to effectively remove phenol in facultatively treated palm oil mill effluent

Palm oil mill effluent (POME) is commonly subjected to biological treatment involving anaerobic, facultative and aerobic processes in series. The presence of phenolic compounds at the aerobic stage inhibits the performance of aerobic microbes. In order to mitigate the inhibitory effect, removal of phenolic compounds in facultatively treated POME prior to the aerobic treatment using low-cost adsorbent is proposed as a solution. In this study, the performance of oil palm frond-derived (OPF) biochar prepared using steam pyrolysis was investigated for effective removal of phenolic compounds. Adsorption kinetics and equilibrium tests were performed to assess the time required to reach adsorption equilibrium and uptake capacity for phenol, catechol and gallic acid spiked in phosphate buffered ultrapure water and in facultatively treated POME.

Figure 1: One-step steam pyrolysis reactor

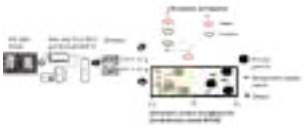


Figure 2: Study graphical abstracts

Fatini Mat Arisah | PhD (Environmental Biotechnology)
fatiniarisah@gmail.com | Supervisor: Dr. Mohd. Zulkhairi Mohd. Yusoff

PhD STUDENT

Bioremediation of hexavalent chromium by a local biosurfactant-producing strain

Chromium is highlighted as among the primary pollutants by the United States Environmental Protection Agency (USEPA) since it exhibits adverse impacts on ecology over minimal exposure. The hexavalent species possess significantly higher levels of toxicity relative to other valence states. In this study, *Pseudomonas aeruginosa* RW 9 was used to remediate the hazardous ion. The local biosurfactant producing strain was first assessed by introducing it in growth media supplemented with a range of Cr(6+) concentration and changes in morphology were observed using Field Emission Scanning Electron Microscope. To further understand the potential use of this strain in bioremediation, its mechanisms in removing Cr(6+) were assessed. The role of the cell membrane was determined using Fourier-Transform Infrared Spectroscopy while cell lysis was done to determine the amount of intracellularly accumulated ions. The role of biosurfactant in bioremediating the ions will also be studied in which the finding will unleash the role of metal in biosurfactant synthesis.

Figure 1: Remediation experiment

Lawrence Ng Yee Foong | PhD (Materials Science)
lawrenceyfng@gmail.com | Supervisor: Prof. Ts. Dr. Hidayah Ariffin

PhD STUDENT

Utilisation of nanobiochar and cellulose nanofibrils as nucleating agents in Poly(3-hydroxybutyrate-co-hydroxyhexanoate) nanobiocomposite

This study was conducted to develop a hybrid nanocomposite of nanobiochar (NBC), cellulose nanofibril (CNF) and the biodegradable polymer, poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx) to improve the crystallisation properties of PHBHHx. NBC was produced by pyrolysis of oil palm empty fruit bunches (OPEFB) followed by ball milling to produce nano-sized biochar particles. Before combining the three components into a hybrid nanocomposite, preliminary testing was done to assess the compatibility of NBC and CNF individually as nucleating agents and fillers on PHBHHx. This was achieved by fabrication of composites via internal mixing of PHBHHx with each type of filler separately followed by various analysis. Response surface methodology was applied using a central composite design to optimise the formulation and conditions to achieve the best possible crystallisation behavior.

Liana Noor Megashah | PhD (Industrial Biotechnology)
lianamega06@yahoo.com | Supervisor: Prof. Ts. Dr. Hidayah Ariffin

PhD STUDENT

Sustainable treatment methods for nanocellulose production from oil palm biomass

Nanocellulose has become of interest in many applications such as in biocomposites, textiles, 3D bio-printing, thickening agents, cosmetics and etc. In brief of this study, upstream process is the main focus in producing nanocellulose. Oil palm biomass (OPB) was used as raw material, and extraction of cellulose by non-halogenated chemical was conducted prior to the production of cellulose nanofibre (CNF). Cellulose was extracted from OPB by introducing sustainable pretreatments methods using the combination of superheated steam, enzyme and totally chlorine-free chemicals. The cellulose pulp produced was then ground using a wet disc mill (WDM) for CNF production. Improvement in CNF production was achieved by further treating the cellulose with superheated steam and cellulase enzyme pretreatments prior to CNF production, which resulted in higher productivity CNF processing. This improvement would be beneficial and useful in scale-up process.

Figure 1: Nanocellulose film obtained from oil palm biomass nanocellulose.

Mohammed Abdillah Ahmad Farid | PhD (Environmental Biotechnology)
abdillah.upm@gmail.com | Supervisor: Prof. Ts. Dr. Hidayah Ariffin

PhD STUDENT

Lignocellulosic nanofibre from oil palm empty fruit bunch for nanocomposites production

The main problem confronting nanocomposites has always been the compatibility between hydrophobic polymer and hydrophilic fibres, resulting in low mechanical performances. Usually, additives are needed to maximise affinity and stability in composite manufacturing. Recent studies have found that cellulose nanofibrils containing residual lignin, known as lignocellulose nanofibrils (LCNF), promotes the compatibility effect between polymer and fibres, thereby enhancing the composite properties. As lignin comprises of polar and non-polar hydrocarbon, it helps in altering the cellulose's polarity to overcome difficulties in establishing well-bonded interfaces with a non-polar polymer matrix. Moreover, the presence of lignin is leveraged to suppress the mechano-radicals formation that causes chain breakage of the cellulose backbone. In this study, the effect of LCNF as an anti-oxidant and natural compatibiliser on the mechanical and thermal properties of nanocomposites are investigated.

Figure 1: Lignin structure in lignocellulosic materials

Figure 2: Cellulose nanofibre (left) and lignocellulosic nanofibre (right)

Mohd Azwan Jenol | PhD (Industrial Biotechnology)
azwan.jenol@gmail.com | Supervisor: Prof. Dr. Suraini Abd-Aziz

PhD STUDENT

Waste to Watts: Sago biomass as potential feedstock for bioelectricity generation

The present study was designed to generate the bioelectricity from sago hampas using microbial fuel cells (MFCs). The aim of this study is to exploit biomass as an alternative source in fuel cell as well as to provide the information of possible biomass handling management. The bioconversion of bioelectricity from sago hampas has two main sections; the evaluation of two main platforms (sugar and VFAs) from sago hampas, and direct generation of bioelectricity from solid sago hampas. Sago hampas was subjected to anaerobic digestion and hydrolysis for the production of VFA and fermentable sugar, respectively. These carbon sources produced were used as electron donor in bioelectricity generation. Further, direct biomass fuel cell was done by directly utilise the solid sago hampas as a carbon source in the MFCs. The bioconversion of sago biomass into bioelectricity in MFC is expected to give positive impact in the advancement of MFC field.

Figure 1: Dual chamber microbial fuel cells for bioelectricity generation

Figure 2: Current practice of waste management of sago hampas in sago starch processing mill

Mohd Hafif Samsudin | PhD (Environmental Biotechnology)
mhafif91@gmail.com | Supervisor: Prof. Dato' Dr. Mohd Ali Hassan

PhD STUDENT

A one-step self-sustained low temperature pool reactor carbonisation of woodchips to produce a biochar derived bio-adsorbent effective for removal of organic pollutants

The present study was designed to develop a high surface area of biomass-derived bio-adsorbent from a one-step self-sustained pool-reactor carbonisation process. A normal carbonisation technique cannot achieve adsorbent-for-wastewater standard due to its surface chemistry (low BET surface area, pore size and pore diameter). It does not have enough adsorption capacity for organic pollutants because biochar usually possesses a nonpolar surface due to manufacturing conditions at high temperatures, which is a disadvantage for some applications because of a poor interaction with some polar adsorbates. A one-step self-sustained low temperature carbonisation would be significant progress in a development of biochar technology. High surface area with microporous structure can be achieved by adjusting the moisture content of raw materials at range 20-40% to create a partial activation.

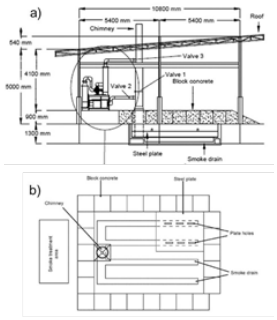


Figure 1: (a) Schematic diagram of pool type reactor, (b) plan view

Mohd Idham Hakimi Razali | PhD (Environmental Biotechnology)
idhamhakimi@ymail.com | Supervisor: Dr. Mohd Zulkhairi Mohd Yusoff

PhD STUDENT

Utilisation of oil palm trunk for wastewater treatment

The current study emphasised the production of biochar from oil palm trunk (OPT) using slow pyrolysis as the process before activation which later will be used as bioadsorbent for wastewater treatment. Prior carbonisation, the OPT sample was evaluated which the trunk divided into different parts, namely; whole trunk (OPTW), main part of the trunk which consist of peripheral part and core (OPTM), bark (OPTB), peripheral (OPTP) and core (OPTC) (Figure 1). Then, the samples were performed on the proximate and ultimate analysis such as extractives, ash, lignin, cellulose, hemicellulose content, TGA, CHNOS, and FTIR. Finally, the sample will be undergoes carbonisation and the production yield, surface area, pore volumes and size and functional group compounds were determined.

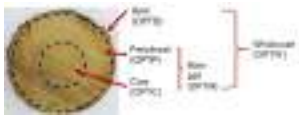


Figure 1: Oil palm trunk cross-section

Figure 2: Oil palm trunk's parts and carbonised sample; OPTW (whole part), OPTM (main part), OPTB (bark), OPTP (peripheral), and OPTC (core)

Muhamad Yusuf Hasan | PhD (Bioprocess Engineering)
myusufhasan@gmail.com | Supervisor: Prof. Dato' Dr. Mohd Ali Hassan

PhD STUDENT

Co-composting oil palm empty fruit bunch and anaerobic sludge palm oil mill effluent in closed system

Co-composting of oil palm empty fruit bunch and sludge palm oil mill effluent waste management in mill area. High lignocellulosic material slows down rate of degradation. Low level and inconsistent of aging sludge and different method of mill operations also contribute to inefficient compost process. Quantify microbes and lignocellulosic degradation to determine of compost stage process and estimates of compost performance to determine through modelling. Composting process factor commonly included in compost mathematical model are about six process factor has been applied in. A deterministic model example substrate degradation limiting process to imitate limitation of actual process. Knowledge of process factor limiting fusion and direct inclusion of the possible interactions between the process factor as part of the model's structure could comprehend composting process. Composting is a complex process hence incorporation factor limiting modeling could gain new insight and practicality which compensates understanding to first principle mathematical model.

Figure 1: Composter

Figure 2: Compost

Norhani Jusoh | PhD (Industrial Biotechnology)
norhanijusoh@gmail.com | Supervisor: Prof. Ts. Dr. Hidayah Ariffin

PhD STUDENT

Energy efficient and high productivity cellulose nanofibril production from oil palm empty fruit bunch by wet disc milling process

Nanocellulose is cellulosic materials with at least one dimension in the nanometer size and can be isolated from different types of lignocellulosic materials. The present work is designed to develop an energy efficient and high productivity sustainable CNF production by utilizing oil palm empty fruit bunch (OPEFB) as raw material. The study begins with investigation on the effect of feedstock and processing conditions on energy consumption during CNF production through wet disc milling process. Superheated steam is applied as alternative pre-treatment before nanofibrillation using wet disc milling with the aim to reduce the cellulose degree of polymerisation (DP). The effect of lignin content on the characteristics and energy consumption during CNF production will also be evaluated. Furthermore, the research is proceeded with large scale of CNF production based on processing conditions of the laboratory scale. The feasibility of large-scale CNF production using excess steam and OPEFB at the palm oil mill will be simulated by using SuperPro Designer software.

Figure 1: Conventional cellulose nanofibrils production from lignocellulose.

Nur Sharmila Sharip | PhD (Material Science)
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PhD STUDENT

Bionanocomposites for tibial inserts potential application

Ultra-high molecular weight polyethylene (UHMWPE) has been long used for components of artificial joint replacement (arthroplasty) such as tibial inserts. Yet the longevity of this material is limited by abrasion and fatigue due to rolling and sliding of metal components on its surface under external load. These wear effects cause generation of wear debris which in the end leads to inflammation, osteolysis and failure. Therefore, this research focuses on implementing cellulose nanofibrils (CNF) as filler in UHMWPE polymer matrix. Besides possessing good biocompatibility, CNF as a nature-based material bears an excellent mechanical properties, tailorable surface chemistry, good flexibility and elasticity. Considering higher aspect ratio materials can be more effective in improving hardness and modulus of UHMWPE, focus on research using CNF, a high aspect ratio organic materials would be beneficial to the field. Accordingly, the use of CNF in UHMWPE could produce a material with good biocompatibility as arthroplasty components.

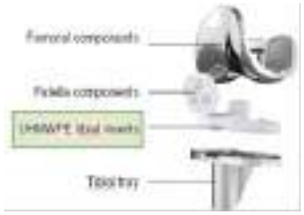

Figure 1: UHMWPE as component of total knee arthroplasty.

Figure 2: The UHMWPE/CNF nanocomposite and neat UHMWPE.

Nurul Ain Abu Bakar | PhD (Environmental Biotechnology)
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PhD STUDENT

Production of biosugar from empty and partially filled paddy grain waste

Empty and partially filled paddy grain (EPFG) is one type of wastes produced in the seeds milling factory. The grain is removed during cleaning stages due to the lack of grain inside the seed coat. The large quantities are accumulated at the factory premises before its removal to the landfill. Therefore, re-directing utilisation of EPFG toward biosugar production via enzyme hydrolysis would (a) provide sustainable feedstock for biosugar production, (b) tackle the abundance of on-site EPFG waste (c) greenhouse gas generation at landfill. Two types of approach will be used in this study which consists of experimental and simulation analysis. First, under laboratory study, the composition of EPFG was determined followed by optimisation of biosugar production using *Acremonium cellulase* enzyme. Simulation of commercial scale biosugar production to determine the effects of conversion process towards the environment. Finally, the overall process will be economically evaluated to determine the minimal selling price for biosugar.

Figure 1: Empty and partially filled paddy grain in paddy milled factory premises

Figure 2: Close up photo of 1g of empty and partially filled paddy grain

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PhD STUDENT

Hydrothermal pretreatment for enhancing biosugars production from oil palm frond

Generation of dry solid biomass from the oil palm industry is predicted to increase up to 110 million tonnes in 2020. Oil palm frond is among the main oil palm wastes produced. The main concern in the application of lignocellulosic materials is that it requires aggressive pretreatment to break down the complex matrix formed by cellulose, hemicellulose and lignin. Among available pretreatment methods, hydrothermal pretreatment appeared to effectively improve the digestibility of lignocellulosic biomass which leads to higher sugar yield. This work investigates the performance of hydrothermal pretreatment in improving sugar recovery from oil palm frond. Findings from this study are expected to provide better understanding on hydrothermal hydrolysis and further highlight the potential of oil palm frond as a renewable carbon source.

Figure 1: Experimental apparatus

Figure 2: HPLC sample preparation

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PhD STUDENT

Development of molecular-based indicator to indicate the contamination due to palm oil mill effluent final discharge

The present study was designed to provide a thorough overview on the effect of POME final discharge towards bacterial communities in the receiving river water with regards to their genes and metabolites profile. The information gained from this study will be used to identify the key gene that governs the POME biodegradation and the potential biomarkers to improve the monitoring of POME contamination in the river water. This study is crucial to help us comprehend the influence of POME discharge into the river water, which will ultimately improve the sustainability of the palm oil industry. In this study, a physicochemical analysis complemented with the Ribodepleted Shotgun RNA Sequencing is used to unravel the bacterial community transcriptional profiles, followed by the expression of selected up/down-regulated genes involved in POME biodegradation. Meanwhile, the untargeted community metabolomics analysis is used to describe the metabolites expressed from the entire bacterial community.

Figure 1: The introduction of POME final discharge into the receiving river water.

Figure 2: The untargeted community metabolomics analysis using GC-MS

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PhD STUDENT

The use of oil palm empty fruit bunch and palm oil mill effluent as compost in oil palm plantations: nutrients recycling system for oil palm industry

Fertilisers are used to enhance the growth and health plants. Frequent and long-term application of chemical fertiliser could affect soil biodiversity. Malaysia produces about 59 percent of the world's supply of palm oil and second largest produce after Indonesia. Excess fertiliser application to oil palm plantation may happen to increased consumption and excessive chemical fertiliser application that eventually led to environmental pollution. In Malaysia, one cycle of oil palm plantation need around 25 years. Many research on physical and chemical characteristic for short and long term done on plant and soil of oil palm plantation. By the way, effect on frequently application for long term used inorganic fertiliser still make question on affect on soil diversity has not been reported. So this research conduct for this investigated application based on physical characteristic, chemical composition, microbial diversity and oil palm production correlation.

Figure 1: Oil palm Plantation at Felda Serting Hilir Negeri Sembilan Malaysia

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PhD STUDENT

Identification and evaluation of toxicants in palm oil mill effluent final discharge in Malaysia

Figure 1: *Daphnia magna*

Figure 2: *Zebrafish embryo*

In this study, the toxicity effect of POME final discharge samples from three different palm oil mills were evaluated based on whole effluent toxicity (WET) and toxicity identification evaluation (TIE) using *Daphnia magna* and *Zebrafish embryo*. First, POME final discharge samples were characterised to know the basic parameters and minerals concentration. Second, the toxicity of POME final discharge was conducted by WET method to observe a LC50. Third, TIE procedure was conducted, which include three phases. At the beginning of the TIE, phase I was performed with pH adjustments, aeration, filter, solid phase extraction, EDTA and STS addition processes to categorise the group of toxicants. Then toxicity tests were conducted using the solutions after manipulated in TIE phase I. In TIE Phase II, the suspected toxicants were identified by GC-MS. Finally, in TIE Phase III, the suspected toxicants were confirmed with original these chemicals by GC-MS whether these chemicals were really toxic to test organisms.

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MASTER STUDENT

Production of bacterial nanocellulose (BNC) from pineapple peels

Figure 1: Bacterial nanocellulose produced by using HS standard media.

Production of bacterial nanocellulose (BNC) is becoming increasingly popular owing to its environmentally friendly properties. BNC may have applications in a variety of contexts. However, culture medium to produce BNC occupies approximately 30% of the total cost. Therefore, one important and challenging aspect of the fermentation process to produce BNC is the identification of a new cost-effective culture medium that can facilitate the production of high yields within short periods of time, thereby improving BNC production and permitting application of BNC in the biotechnological, medical, pharmaceutical, and food industries. Since Malaysia is blessed with abundant agricultural wastes and utilisation of this raw material could generate extra benefit to the related industries while at the same time developing new culture medium for BNC production. This study aims to utilise the pineapple peels as potential substrate for the production of BNC (prior to pretreatment for fermentable sugar release). The BNC produced were then subjected as raw materials for food specifically for the production of *Nata de pina* (from pineapple fruits).

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MASTER STUDENT

Utilisation of food waste in UPM for biogas production

Figure 1: Pilot plant scale anaerobic digester.

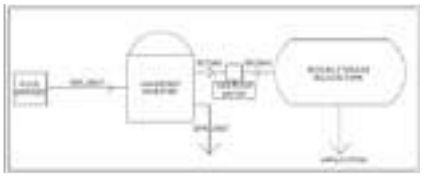

Figure 2: Flow diagram of biogas production

UPM generated about 5 - 6 tonnes of municipal solid waste (MSW) every day. Organic waste fraction contributes about 35% from the MSW generated. Organic waste which consists mostly of food waste has potential to be utilised as feedstock for biogas production. Biogas contains about 60% of methane which can be used for cooking or conversion to electricity via gas engine. First, a survey on MSW generation and composition were conducted on different categories of consumer in UPM. Second, an experiment was performed at pilot plant scale. MSW obtained from the source is segregated, then the organic waste fraction is mixed with water (1:1 ratio) and grinded into a slurry form. The slurry will be transferred into anaerobic digester for biogas production. In order to increase the production of biogas and methane yield, parameters such as organic loading rate, hydraulic retention time, pH, temperature (mesophilic) of the anaerobic pH, temperature (mesophilic) of the anaerobic digester was optimised.

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MASTER STUDENT

Technical feasibility of lignocellulose nanofibrils as reinforcement material in oil palm empty fruit bunch paper

The present study is conducted to determine the technical feasibility of lignocellulose nanofibrils (LCNF) as filler in oil palm empty fruit bunch (OPEFB) paper, and its effect on the papermaking process. LCNF with different lignin content is prepared and the influence of lignin content on the drainage times during papermaking, as well as mechanical properties of the resultant paper are determined. Additionally, the use of LCNF in papermaking is postulated to reduce the use of dry strength agent (DSA), and hence an experiment is designed to determine the correlation between LCNF and DSA content. At the end of this study, it is expected that the use of LCNF would enhance papermaking process and paper characteristics. Lignin content in LCNF is foreseen to play a significant role in the properties of paper as well as paper processing.

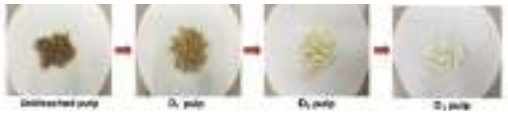

Figure 1. Pulps with different lignin content

Figure 2: Lignocellulose nanofibrils (LCNF) after fibrillation process

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MASTER STUDENT

Fortification of planting medium to enhance bioactivity in Pegaga (*Centella asiatica L.*)

The present study was designed to formulate a fortified planting medium from oil palm biomasses suitable for the enhancement of bioactivity in Pegaga (*Centella asiatica L.*). Different formulation and ratio of planting media will be formulated and fortified with addition of biocompost and biochar. The fortified media will then be used as a medium to plant the Pegaga. Once the cultivation is done, the Pegaga will be analyzed to determine whether the fortified media were able to enhance the bioactivity in Pegaga known for its medicinal, nutraceutical and pharmaceutical properties.

Figure 1: Planting pots of Pegaga with different ratios of fortified biocompost

Figure 2: Total Phenolic Content Analysis

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MASTER STUDENT

Survivability of Bacterial Community in Palm Oil Mill Effluent and Post-Zero Emission of Final Discharge

This study was aimed to assess the factors affecting the survivability of bacterial community, particularly towards pollution bacterial indicators; *Chromatiaceae* and *Alcaligenaceae*, in correlation with the changes of physicochemical properties of palm oil mill effluent (POME). Several factors were tested including temperature, pH, duration of UV irradiation and during low/high crop season of oil palm. In addition, a lab-scale constructed river water system was set-up to assess the bacterial community shift before and after the implementation of zero-emission system. The changes in the functional status of bacteria including the total cell concentration, the viability of bacterial cells and the nucleic acid contents were assessed by using nucleic acid double staining assay based on flow cytometry. Meanwhile, the shift of the composition of bacterial community was analysed by using Illumina MiSeq. The physicochemical properties, nutrient contents and bacterial community shift were then correlated using principle coordinate (PCO) analysis.

Figure 1. POME final discharge sampling point at Palm Oil Mill, Pasoh, Negeri Sembilan

Figure 2: The high-throughput sequencing machine, Illumina MiSeq

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MASTER STUDENT

Biosurfactant production from sludge pit oil by *Pseudomonas* strain

Most surfactants used are only partially and slowly biodegradable; hence it contributes to environmental pollution. Therefore, new approach in biotechnology research on the production of microbial surfactant or known as biosurfactants. It has high potential for becoming the next generation of biosurfactants. It contains of one or two sugar unit linked to one or two B-hydroxy fatty acids, which mainly known to be produced by *Pseudomonas* strain. This study was conducted to optimise and characterise the production biosurfactant grown on sludge pit oil as substrate. The bacterial strain *Pseudomonas* was inoculated in mineral salt medium with different types of carbon sources, concentrations of carbon source, types of nitrogen sources and concentration of nitrogen sources. The 1L fermentation was conducted supplemented with the optimised conditions. The biosurfactant were extracted and purified prior characterisation. Thus, these biologically produced molecules reported to have lower impact on the environmental and better in biodegradability and less toxicity as conventional surfactant.

Figure 1: *Pseudomonas* strain for biosurfactant production .

Figure 2: Fermentation for the production of biosurfactant

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MASTER STUDENT

Mycelium-based biofoam production from oil palm biomass using locally isolated fungus

The usage of petroleum-based products such as expanded polystyrene (EPS) foam has introduced overwhelming environmental effects due to its inability to decompose naturally. Mycelium-based biofoam, which is a novel foam-like biomaterial developed from fungal mycelium grown on agricultural biomass is discovered as a potential alternative for EPS. This study aims to determine the fungal mycelia development by locally isolated fungus on oil palm biomass. A fungal strain which has the ability to produce ligninolytic enzymes and contain the highest chitin content will be selected for mycelium-based biofoam production. As for validation, several mechanical analyses such as compressive strength, flexural strength and impact analysis will be conducted on mycelium-based biofoam to approve its application. Substitution of EPS foam by using local resources will give big impact to counter environmental problems caused by EPS and agricultural waste.

Figure 1. S1, one of the fungi isolated from Sultan Idris Shah Forest Education Centre (SISFEC) for screening and identification

Figure 2: Observation of S1 grown on PDA plate

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MASTER STUDENT

Purification of biodiesel from grease trap waste using activated biochar

Recently, the global energy demand is increasing due to the fast industrialisation and population growth. Biodiesel has attracted numerous researchers worldwide and it was found that it is the best alternative fuels that could reduce both energy and environmental deterioration. Biodiesel is a diesel fuel substitute derived from the transesterification reaction of triglycerides with alcohol in the presence of a catalyst. In this study, grease trap waste was used as a feedstock for the biodiesel production. The grease trap waste which contain high concentration of triglycerides has been sent to wastewater treatment facility as it poses environmental threat and has no further use as of now. With high lipid content, grease trap waste appears to be a cost-effective feedstock for biodiesel production. Impurities removal will be conducted using activated biochar derived from woodchips biomass. The purified biodiesel will be analysed for the methanol content, free fatty acid content, water content, free glycerine content, triglyceride and potassium content in order to meet the European Biodiesel Standards (EN 14214).

Figure 1: Transesterification of grease trap oil into biodiesel and glycerol (by product).

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MASTER STUDENT

Quantification of the functional gene amplification in palm oil mill effluent biodegradation for the development of molecular-based indicator

This research is attempted as a fundamental study to establish a complementary molecular based monitoring system for the currently adapted physicochemical evaluation in determining river pollution caused by palm oil mill effluent (POME). At the earlier stage of this study, metagenomics sequencing was done by Illumina MiSeq platform to confirm the unique presence of bacterial family/order in POME final discharge polluted rivers. In addition, the relationship between the presences of POME contaminants in the rivers with bacterial growth metabolisms were also quantitatively experimented through flow cytometry (FCM) analyses. From the understanding of POME biodegradation pathways, significant genes were conventionally screened by polymerase chain reactions (PCR). The finding from this research would provide a vital clue to design a specific probe for POME detection in the polluted rivers.

Figure 1. Palm oil mill effluent mixing pond.

Figure 2: Flow cytometry for bacterial cell quantitative analyses

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MASTER STUDENT

Bio-sugar production from napier grass grown on palm oil mill effluent final discharge

Napier grass (*Pennisetum purpureum*), also known as "elephant grass" was first introduced in Malaysia in the 1920's from East Africa. There are a few of Napier grass varieties, namely common Napier, red Napier, and Australian dwarf. Like every other biomass, Napier grass is made of lignocellulosic materials, which is a promising feedstock for renewable biofuel production. In a parallel study, Napier grass has shown the capability to phytoremediate polluted waters. However, the effect of those polluted waters towards the Napier grass and its further use is unknown. Therefore, this study attempts to evaluate the physical characteristic of Napier grass supplied with POME final discharge in a constructed wetland system. In addition, this study also attempts to determine the effect of POME final discharge towards the concentration of biosugar in the Napier grass constructed wetland after saccharification.

Figure 1:Napier grass's juice according to the cultivars and treatment.

Figure 2: Grinded sample (Above from left: Common control stem, Common treatment stem, Common control leaves, Common treatment leaves; Below from left: Red control stem, Red treatment stem, Red control leaves, Red treatment leaves).

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MASTER STUDENT

Sequential-Substrate Feeding Saccharification of Sago Hampas into Fermentable Sugars for Biobutanol Production

The recent increase in energy demand and crisis on depletion of fossil fuel worldwide have diverted attention among researchers towards the utilisation of renewable sources for bio-based fuels. The sago agricultural waste or better known as sago hampas is a starchy, lignocellulosic residue that has produced from sago starch processing industries. It has been recognised as one of the alternative raw materials due to its availability, free and abundantly found in Sarawak. The high content of starch (58-60%) and lignocellulosic components (35.9%) in sago hampas could contributes to environmental problem without a proper treatment. Therefore, sago hampas was fully utilised to convert into sustainable biobutanol through acetone-butanol-ethanol (ABE) fermentation by *Clostridium species*. Most of the studies conducted previously only focused on batch saccharification where lower sugar concentration were often obtained make it adequate for biobutanol production. In this study, sequential-substrate feeding saccharification was implemented to enhance the fermentable sugar production.

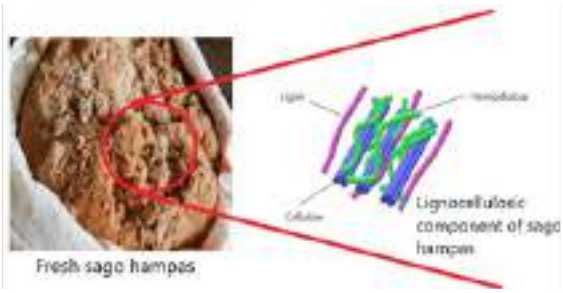

Figure 1: Close-up of lignocellulosic composition of sago hampas

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MASTER STUDENT

The potential use of *Calophyllum inophyllum L.* (nyamplung) seed oil and used cooking oil mixture as environmentally friendly biolubricant

Calophyllum inophyllum L. (nyamplung) is one of the most potential plants for biodiesel feedstock because of its high oil content. Mechanical extraction using screw press is one method to get oil from the seed. The future prospect the uses of lubricant petroleum on the vehicle's engine is predicted to have a bad prospect. Thus, began research to identify suitable materials to replace petroleum-based lubricants. It can produce from vegetable oils and animal oils by chemical modification. But, bio-lubricant properties are easily damaged, so research to improve the shelf life of the bio-lubricant must be done to improve the characteristics such as addition of biolubricant additive or mixture of bio-oil. With the collaboration with Universitas Indonesia, the project objectives are to characterise the nyamplung oil and used cooking oil properties for the formulation of biolubricant and to optimise the formulation of biolubricant properties to replace the petroleum-based lubricants.

Figure 1: C. inophyllum L. (nyamplung).

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MASTER STUDENT

Biosurfactant production by *Pseudomonas aeruginosa* RS6 using biodiesel side stream waste glycerol as a substrate

The growth and production of rhamnolipids by *Pseudomonas aeruginosa* using waste glycerol from biodiesel production as a carbon source is carried in this study. The optimisation is conducted in a laboratory-scale and will be further scaled up in 2 L and 7.5 L bioreactors. Majority of the surfactants present these days are derived from petrochemical sources, that might lead to environmental issues due to their low biodegradability and toxicity. Physical and chemical properties like emulsification, highly biodegradable, low surface tension, antimicrobial and antifungal properties, and less toxicity make biosurfactant is more attractive than a chemical-based surfactant. Although there are numerous studies exhibited the advantages of biosurfactants, cost-effective, relatively high raw-material prices and sustainable production of biosurfactant will be the major concern for large-scale production. This study aims to produce rhamnolipids by locally isolated *Pseudomonas aeruginosa* RS6 using waste glycerol as a substrate.

Figure 1. Rhamnolipids production in 7.5 L bioreactor with recycling accessory

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MASTER STUDENT

Cellulose nanofibre as nucleating agent and nano-reinforcement material for polylactic acid biopolymer

This study is conducted to investigate the nucleation effect of cellulose nanofibres (CNF) on polylactic acid (PLA) biopolymer with the aim to improve its crystallisation behaviors such as crystallisation rate and crystal nucleation density. PLA, CNF and maleated PLA (compatibiliser) are compounded to determine the nucleation effect of CNF on isothermal and non-isothermal crystallisation of PLA. Nanocomposites obtained will be further characterised and compared with control samples which are neat biopolymer in terms of mechanical, morphological, thermal and barrier properties.

Figure 1: Preparation of PLA/CNF nanocomposite using brabender

NEW REGISTERED STUDENT

ILLY KAMALIAH RAMLE
PhD (Industrial Biotechnology)
-
Supervisor: Prof. Dr. Suraini Abd-Aziz
-
Characterisation of Starch Extracted from the Pineapple Plant (*Ananas comosus*) Stem for Caramel Production Through Enzymatic Hydrolysis

IZZATI SABRI
PhD (Environmental Biotechnology)
-
Supervisor: Assoc. Prof. Dr. Norhayati Ramli
-
Investigation of the Potential Molecular Marker from *Alcaligenaceae bacterium* strain S10 as a Pollution Indicator of Palm Oil Mill Effluent (POME) Final Discharge

SITI SYAZWANI MAHAMAD
PhD (Environmental Biotechnology)
-
Supervisor: Assoc. Prof. Dr. Mohd Rafein Zakaria
-
Scale Up Production of Rhamnolipids by *Pseudomonas aeruginosa* using Biodiesel Side Stream Glycerol

IS AIZAT SAMSURI
MSc (Environmental Biotechnology)
-
Supervisor: Dr. Mohd. Zulkhairi Mohd. Yusoff
-
Comparative Studies between In-situ Anaerobic Digestion and Landfill Treatment using Life Cycle Assessment

SARAH FATHIYAH MUBARAK
MSc (Industrial Biotechnology)
-
Supervisor: Prof. Dr. Suraini Abd-Aziz
-
Palm-based Activated Carbon as Alternative Treatment for POME Final Discharge

Wall of Fame

Dr. Sharifah Soplah binti Syed Abdullah

Dr. Sharifah Soplah Binti Syed Abdullah (Abdullah, S.S.S. or better known as Dr. Sharifah Soplah) is working at the section of Bioengineering Technology, Universiti Kuala Lumpur (UniKL). She completed her primary education at Sekolah Kebangsaan Pasir Tinggi, Terengganu and continued her secondary school at Sekolah Menengah Kebangsaan Agama Durian Guling, Terengganu and Maktab Rendah Sains Mara Muar, Johor.

She obtained a Bachelor's degree in Biochemical Engineering from Universiti Kebangsaan Malaysia back in 2001. Upon the completion of her Bachelor's degree, she joined Universiti Kuala Lumpur as a lecturer in 2002. She continues her passion in the engineering field by pursuing her Master's degree study in Bioprocess Engineering at Universiti Putra Malaysia under the supervision of Professor Dato' Dr. Mohd Ali Hassan and graduated in 2008. Her master research involved the production of lignophenol from oil palm empty fruit bunch. With her persistent spirit in searching for knowledge, she then furthers her doctorate study under the supervision of Prof. Yoshihito Shirai and Prof. Dato' Dr. Mohd Ali Hassan in Bioprocess Engineering and gained her PhD from Universiti Putra Malaysia (UPM) in 2015. Her doctorate study involved the efficiency of bioethanol production from oil palm frond juice. Her research disciplines is in the field of Bioprocess Engineering and Bioengineering. Other than that, she also has various skills and expertise in Environmental Biotechnology, Industrial Biotechnology, Biomass Conversion and Fermentation Technology.

Dr. Soplah is an active member of various professional organizations such as The Institution of Chemical Engineers (IChemE), Malaysia Board of Technologists (MBOT), Board of Engineers Malaysia (BEM) and Asian Federation of Biotechnology (AFOB). In 2016 she was awarded MARA Subsidiaries Icon Award by Majlis Amanah Rakyat (MARA). To date, she has led various research projects as a project leader under the funding of Kementerian Pengajian Tinggi (KPT) and Internal UniKL. She also actively contributes as a co-researcher for other research grants. Dr. Sharifah Soplah has a Scopus *h*-index of 4 with more than 9 publications and has been cited 79 times in Scopus.

Activities Gallery

EB ANNUAL 'GOTONG-ROYONG'

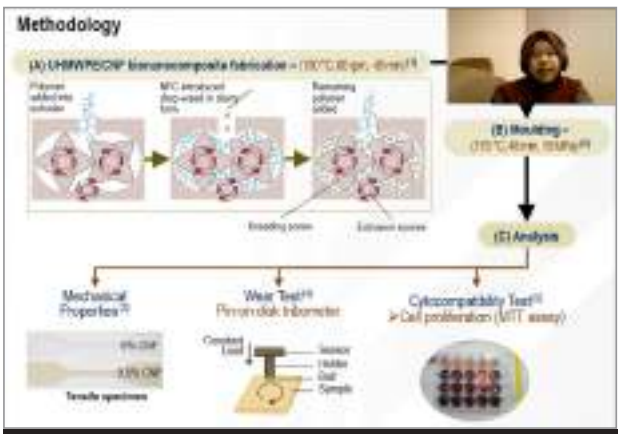
Cleaning and tidying the laboratories

Revamping the BTC lobby

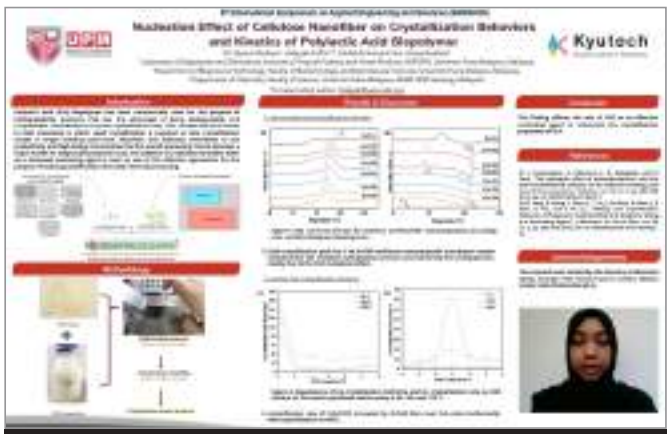
Stocktake on lab consumables

Reorganising researcher rooms to comply with Covid-19 precautions

SAES 2020



Oral Presentation



Poster Presentation

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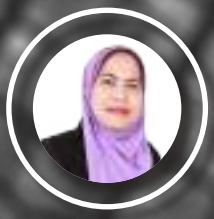
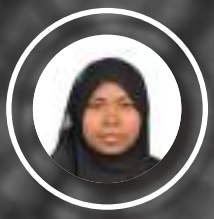


Prof. Dr. Suraini
Abd-Aziz

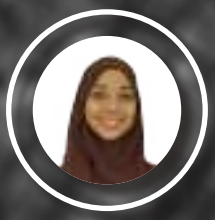
Prof. Ts. Dr.
Hidayah Ariffin

CHIEF EDITOR



Dr. Farah Nadia
Mohammad Padzil

EDITORIAL TEAM



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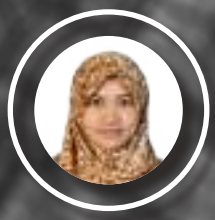

Enis Natasha Noor
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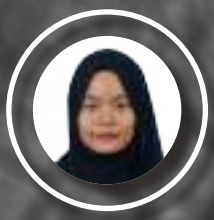
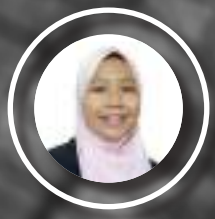


Izza Nadira
Abu Bakar

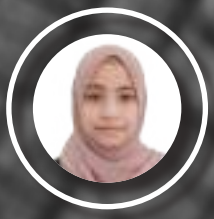
Lawrence Ng Yee
Fong

Mohammed Abdillah
Ahmad Farid

Zarry @ Jay Jay
Mohamad



Nurul Sabrena Hanafi
@ Mohd Hanafi



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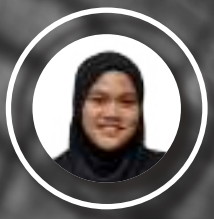
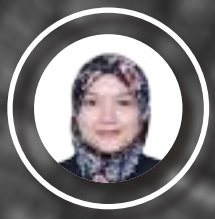


Besek Mariam
Mohamad Jahis



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