



INSTITUTE OF CLIMATE CHANGE BULLETIN

VOLUME 8 | ISSN (2462 - 1528) | JULY - DEC 2020



EDITORIAL TEAM

Advisors >>

Prof. Dr. Mohd. Nizam Mohd. Said Prof. Ir. Dr. Mardina Abdullah

Chief Editor »

Dr. Teh Wai Leong

Editor >>

Ts. Dr. Wan Shafrina Wan Mohd Jaafar

Editorial Support >>

Nurul Hajijah Hair Noor Hidayu Sukma Salleh Syarina Mohd Sah Nurul Ain Nordin Noor Shuhaira Rejab

Published by >>

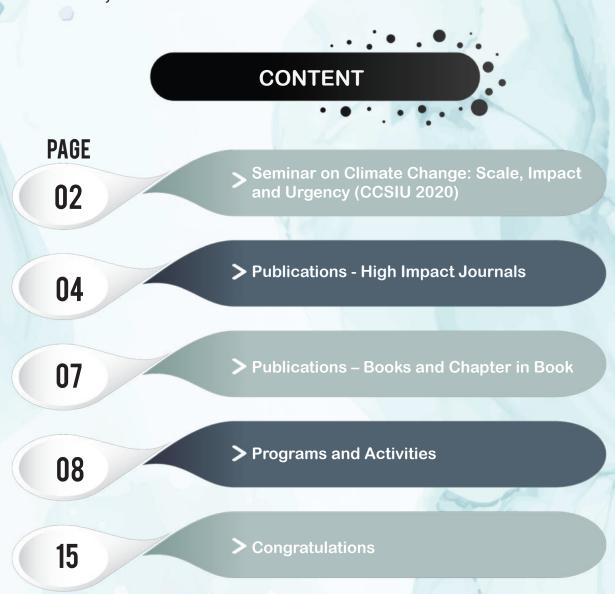
Institute of Climate Change (IPI) Level 3, Research Complex, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, MALAYSIA.

Tel: 03-8911 8482

Email: pghikp@ukm.edu.my Website: http://www.ukm.my/ipi

Copyright »

Institute of Climate Change (IPI) retains the copyright over all materials published in the bulletin. No part of this bulletin may be reproduced and transmitted in any form without the prior written permission of the institute.





Seminar on Climate Change: Scale, Impact and Urgency (CCSIU 2020)

Assoc. Prof. Dr. Marlia Mohd Hanafiah

Chair of CCSIU 2020 & Head of Centre for Tropical Climate Change System, Institute of Climate Change, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia Email: mhmarlia@ukm.edu.my



The Center for Tropical Climate Change System (IKLIM), under the Institute of Climate Change (IPI) of UKM, organized the "Climate Change: Scale, Impact and Urgency" Seminar on 25 August 2020 at Hotel Puri Pujangga in UKM, in collaboration with the UKM-YSD Chair in Climate Change and the Marine Ecosystem Research Center (EKOMAR), under the Faculty of Science and Technology (FST) of UKM.

This seminar is one of the IKLIM initiatives in collaboration with the UKM-YSD Chair in Climate Change and the EKOMAR, to provide a platform for knowledge sharing and idea exchanges on climate change issues, involving partnerships from various relevant field experts and agencies, so that the level of awareness and readiness of the community to address issues on climate change can be strengthened.





The objectives of this seminar are to provide platform for researchers and students to collaborate in the field of climate change and to create awareness and foster participants' understanding in supporting global warming mitigation initiatives. This seminar enables participants to learn knowledge related to climate change issues from the presentation sessions.

About 150 participants from the representatives of government and non-government agencies, researchers, and graduate students joined this seminar, mostly through the Zoom Webinar platform. This seminar discusses various climate change issues officiated by the Deputy Vice-Chancellor in Research and Innovation, Prof. Dato' Ir. Dr. Abdul Wahab Mohammad. This seminar was initiated by the keynote speaker, Prof. Datuk Dr. Azizan Baharuddin, from the Institute of Understanding Islamic Malaysia, with the title of "Islamic Declaration on Climate Change (IDCC): Guidelines for Empowering Sustainable Development Goals", and then followed by four invited talks, namely,

- Sustainable Land Management in Southeast Asia under Climate Change, Case of Palm Oil Management by Prof. Dr. Edvin Aldrian, from the Agency for the Assessment and Application of Technology, Indonesia.
- Climate Projections and Downscaling Crucial Tools for Impact Assessment by Assoc. Prof. Dr. Liew Ju Neng from UKM.
- Responses, and Urgency: Economic & Policy Perspectives by Assoc. Prof. Dr. Rawshan Ara Begum from UKM.
- Life Cycle Thinking on Responses to Climate Change by Assoc. Prof. Dr. Marlia Mohd Hanafiah from UKM.









PUBLICATIONS

HIGH IMPACT JOURNALS

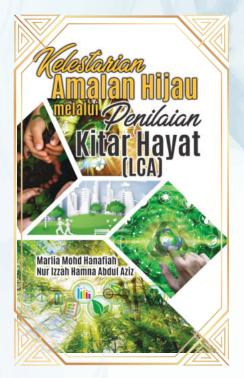
BIL	PAPER TITTLE JOURNAL / PROCEEDING NAME	AUTHORS
1	Double H-shaped complementary split ring resonator with different orientations for quad-band satellite applications Results in Physics (Q1)	Air Mohammad Siddiky** Mohammad Rashed Iqbal Faruque
2	Hexagonal Shaped Near Zero Index (NZI) Metamaterial Based MIMO Antenna for Millimeter-Wave Application IEEE Access (Q1)	Samir Salem Al-Bawri**
3	Inverse double-C shaped square split ring resonator-based metamaterial with multi-resonant frequencies for satellite band applications Results in Physics (Q1)	Air Mohammad Siddiky** Mohammad Rashed Iqbal Faruque Sabirin Abdullah
4	Prebiotic oligomerization and self-assembly of structurally diverse xenobiological monomers Scientific Reports (Q1)	Kuhan Chandru**
5	Individual Tree Attribute Estimation and Uniformity Assessment in Fast-growing Eucalyptus spp. Forest Plantations Using Lidar and Linear Mixed-effects Models Remote Sensing (Q1)	Wan Shafrina Wan Mohd Jaafar**
6	A mutual coupled concentric crossed-Line split ring resonator (CCSRR) based epsilon negative (ENG) metamaterial for Tri-band microwave applications Results in Physics (Q1)	Norsuzlin Mohd Sahar
7	Computational analysis of octagonal torus-shaped nano meta-atom through fractional absorption bandwidth for applications in the terahertz regime Results in Physics (Q1)	Norsuzlin Mohd Sahar
8	Development of A Robust Multi-Scale Featured Local Binary Pattern for Improved Facial Expression Recognition Sensors (Q1)	Mohammad Rashed Iqbal Faruque
9	Dispersion of radionuclides from coal-fired brick kilns and concomitant impact on human health and the environment Radiation Physics and Chemistry (Q1)	Mohammad Rashed Iqbal Faruque
10	Modified-Segmented Split-Ring Based Polarization and Angle-Insensitive Multi-Band Metamaterial Absorber for X, Ku and K Band Applications IEEE Access (Q1)	Norsuzlin Mohd Sahar
11	Quad band metamaterial absorber based on asymmetric circular split ring resonator for multiband microwave applications Results in Physics (Q1)	Mandeep Singh Jit Singh

BIL	PAPER TITTLE JOURNAL / PROCEEDING NAME	AUTHORS
12	Review of optimal methods and algorithms for sizing energy storage systems to achieve decarbonization in microgrid applications	Rawshan Ara Begum
	Renewable and Sustainable Energy Reviews (Q1)	
13	Solid waste collection optimization objectives, constraints, modelling approaches, and their challenges toward achieving sustainable development goals Journal of Cleaner Production (Q1)	Rawshan Ara Begum
14	Spatial assessment of land use impact on air quality in mega urban regions, Malaysia Sustainable Cities and Society (Q1)	Khairul Nizam Abdul Maulud
15	Synthesis, Characterization, and Analysis of Hybrid Carbon Nanotubes by Chemical Vapor Deposition: Application for Aluminum Removal Polymers (Q1)	Marlia M. Hanafiah
16	Waste collection route optimisation model for linking cost saving and emission reduction to achieve sustainable development goals Sustainable Cities and Society (Q1)	Rawshan Ara Begum
17	A compact square-shaped left-handed passive metamaterial with optimized quintuple resonance frequencies for satellite applications Chinese Journal of Physics (Q2)	
18	Electric field controlled cohesive symmetric hook-C shape inspired metamaterial for S-band application Chinese Journal of Physics (Q2)	Rasheduzzaman Sifat** Mohammad Rashed Iqbal Faruque Eistiak Ahmed
19	Carbon Emissions from Oil Palm Induced Forest and Peatland Conversion in Sabah and Sarawak, Malaysia Forests (Q2)	Wan Shafrina Wan Mohd Jaafar** Khairul Nizam Abdul Maulud Biswajeet Pradhan
20	Hydrogen-free hydrogenation of nitrobenzene via direct coupling with cyclohexanol dehydrogenation over ordered mesoporous MgO/SBA-15 supported Cu nanoparticles <i>RSC Advances (Q2)</i>	Marlia M. Hanafiah
21	Improving Prediction Accuracy of Socio-Human Relationships in a Small-Scale Desalination Plant Sustainability (Q2)	Marlia M. Hanafiah
22	Phytoremediation of TSS, NH3-N and COD from Sewage Wastewater by Lemna minor L., Salvinia minima, Ipomea aquatica and Centella asiatica <i>Applied Sciences (Q2)</i>	Marlia M. Hanafiah
23	The Potential Use of Car Windscreens for Post-Accident Dose Reconstruction in the Periphery of Nuclear Installations Applied Sciences (Q2	Mohammad Rashed Iqbal Faruque
24	A Review of the Measurement Method, Analysis and Implementation Policy of Carbon Dioxide Emission from Transportation Sustainability (Q2)	Khairul Nizam Abdul Maulud

BIL	PAPER TITTLE	AUTHORS
	JOURNAL / PROCEEDING NAME	
25	Compositional Analysis of Chalcopyrite Using Calibration- Free Laser-Induced Breakdown Spectroscopy Applied Sciences (Q2)	Mohammad Rashed Iqbal Faruque
26	A spatio-temporal agent-based approach for modeling the spread of zoonotic cutaneous leishmaniasis in northeast Iran Parasites & Vectors (Q1)	Biswajeet Pradhan
27	CO ₂ utilization as a soft oxidant for the synthesis of styrene from ethylbenzene over Co ₃ O ₄ supported on magnesium aluminate spinel: role of spinel activation temperature <i>Scientific Reports (Q1)</i>	Marlia M. Hanafiah
28	Do Termitaria Indicate the Presence of Groundwater? A Case Study of Hydrogeophysical Investigation on a Land Parcel with Termite Activity Insects (Q1)	Biswajeet Pradhan
29	Dynamic impacts of economic growth and forested area on carbon dioxide emissions in Malaysia Sustainability (Q2)	Rawshan Ara Begum** Asif Raihan Mohd Nizam Mohd Said
30	Implementation of Artificial Intelligence Based Ensemble Models for Gully Erosion Susceptibility Assessment Remote Sensing (Q1)	Biswajeet Pradhan
31	In flood susceptibility assessment, is it scientifically correct to represent flood events as a point vector format and create flood inventory map? Journal of Hydrology (Q1)	Biswajeet Pradhan
32	Novel ensemble of multivariate adaptive regression spline with spatial logistic regression and boosted regression tree for gully erosion susceptibility Remote Sensing (Q1)	Biswajeet Pradhan
33	Novel machine learning approaches for modelling the gully erosion susceptibility Remote Sensing (Q1)	Biswajeet Pradhan
34	Particle swarm optimised fuzzy controller for charging-discharging and scheduling of battery energy storage system in MG applications Energy Reports (Q2)	Rawshan Ara Begum
35	Study the impact of three Asian industrial regions on PM2.5 in Taiwan and the process analysis during transport Atmospheric Chemistry and Physics (Q1)	Maggie Chel Gee Ooi
36	The value of thermal management control strategies for battery energy storage in grid decarbonization: Issues and recommendations Journal of Cleaner Production (Q1)	Rawshan Ara Begum

Note: Only authors affiliated to IPI are shown. **First author.

PUBLICATIONS



BOOKS

*Kelestarian Amalan Hijau Melalui Penilaian Kitar Hayat (LCA)*Authors: Marlia Binti Mohd Hanafiah, Nur Izzah Hamna Abdul Aziz

Publisher: Penerbit UKM ISBN: 978-967-2429-22-7

CHAPTER IN BOOK

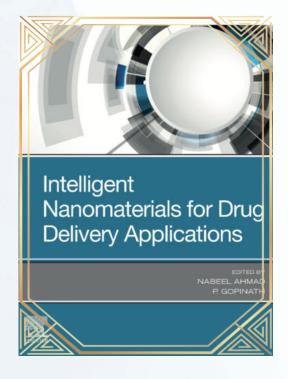
Nanotoxicology and Its Remediation

Book Title: Intelligent Nanomaterials for Drug Delivery Applications

Authors: Vinay Kumar, Sivarama Krishna Lakkaboyana, Neha Sharma, Subhrangsu Sunder Maitra,

Marlia Mohd Hanafiah Publisher: Elsevier

ISBN: 978-0-12-817830-0





ROGRAMS AND ACTIVITIES



Date: 7 July 2020

Venue: Earth Observation Centre IPI Building Organizer: Institute of Climate Change (IPI)

On 7 July 2020, IPI organized the Technology Transfer Workshop: GPS Data Server, aiming for sharing knowledge on server management for near real-time data collection. All technical staff from IPI, especially those who work with data management, joined the workshop. The workshop was conducted by Mrs. Aslinda Oon Ridzuan Oon and Ms. Nurul Hajijah Hair.





Seminar Series 3/2020: Air Pollution Connection to the **COVID19 Pandemic**

Date: 24 July 2020

Medium: Online Zoom Application

Organizer: Institute of Climate Change (IPI)

Speaker: Assoc. Prof. Dr. Mohd Shahrul Mohd Nadzir

(Faculty of Science & Technology)

In line with the COVID-19 situation in Malaysia, IPI invited Assoc. Prof. Dr. Mohd Shahrul Mohd Nadzir from Faculty of Science and Technology UKM (FST) to give a seminar for IPI Seminar Series 3/2020. The talk entitled "Air Pollution" Connection to the COVID-19 Pandemic" has attracted as many as 257 participants from UKM and various organizations. The seminar was organized through the Zoom meeting and also was streamed live in the official IPI Facebook.



Closing Ceremony of Sustainable School Project: Recycle for Life

Date: 23 July 2020

Venue: Meeting Room, Level 5 Research Complex **Organizer:** UKM-YSD Chair in Climate Change

The closing ceremony was officiated by Yang Teramat Mulia Tunku Puteri Intan Safinaz, Chairman Yayasan Sultanah Bahiyah, through the Zoom platform, on 23rd July 2020. This project was funded by Yayasan Hasanah and organized by UKM in collaboration with Yayasan Sultanah Bahiyah and E-Idaman Sdn. Bhd.











IPI Postgraduate Research Colloquium

Date: 5 August 2020

Venue: Institute of Climate Change (IPI) **Organizer:** Institute of Climate Change (IPI)

External Reviewer: Assoc. Prof. Dr. Helmi Zulhaidi Mohd Shafri (Universiti Putra Malaysia) and

Adjunct Prof. Dr. Noordin Ahmad (Universiti Kebangsaan Malaysia)

The IPI postgraduate research colloquium was organized to provide a platform for students to present their research progress and get feedback from the internal and external reviewers. To comply with the COVID-19 SOPs, the program was held at two different places to reduce the number of participants in one room. In the end of the program, two students namely, Mr. Muhammad Khairul Adib Bin Muhammad Yusof (PhD) and Mr. Faiz Bin Arif (Master) were awarded for Best Presentation Award.





Workshop on Review Paper Writing

Date: 15 September 2020

Venue: Meeting Room, Research Complex UKM **Organizer:** Institute of Climate Change (IPI)

Speakers: Prof. Dato' Dr. Roslan Abd Shukor (Universiti Kebangsaan Malaysia) and

Prof. Dr. Mahammad Abdul Hannan (Universiti Tenaga Nasional)

IPI continued to support students' research progress by providing a workshop on review paper writing, despite the COVID-19 pandemic. Two speakers were invited to share their valuable knowledge and experiences in writing the review papers. The two talks were "Review Article: Editor's Perspective" and "Comprehensive Review Paper Writing for High Impact Journal", given respectively by Prof. Dato' Dr. Roslan Abd Shukor from Universiti Kebangsaan Malaysia and Prof. Dr. Mahammad Abdul Hannan from Universiti Tenaga Nasional.







Date: 21 – 22 September 2020 **Venue:** Everly Hotel, Putrajaya

Organizer: Earth Observation Centre, IPI and Department of Environment, KASA

The purpose of this seminar was to provide a comprehensive description of the findings on the entire study consisting of ecological sub-topics, water quality, morphology, and database. This is one of the terms of references to provide human capital development training and transfer of specific knowledge related to the Government of Malaysia through the Department of Environment (DOE). Several seminars were held and attended by 60 participants from various agencies such as the Attorney General's Chamber, Ministry of Foreign Affairs of Malaysia, Malaysian National Security Council, and other committee members of this project. Opening remarks by Prof. Dato' Dr. Nor Ghani bin Md. Nor, Pro Vice-Chancellor (Income Generation and Development) while the opening ceremony was done by Pn. Norlin Jaafar, Director General, Department of Environment, Ministry of Environment and Water.









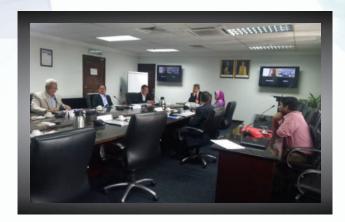


UKM-YSD Board of Trustee Committee Meeting

Date: 22 September 2020

Venue: Chancellory Meeting Room **Organiser:** Chancellor Foundation, UKM

The UKM-YSD Board of Trustee Meeting (BOT) was held twice per year and this was the second BOT meeting for 2020. The meeting was jointly organized with the UKM-YSD Chair for Sustainable Development: Zero Waste Technology. During the meeting, both Chairs presented activities and annual reports of the Chair to the members.





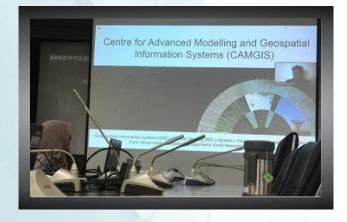
Welcoming Session of Distinguished Professor Institute of Climate Change

Date: 24 September 2020 **Medium:** Online Zoom Meeting

Guest Speaker: IPI Distinguished International Professor, Prof. Dr. Biswajeet Pradhan (Director of the Centre for Advanced Modelling and Geospatial Information Systems

(CAMGIS), University of Technology Sydney)

IPI has appointed Prof. Dr. Biswajeet Pradhan as the IPI distinguished international professor. He is now the director of the Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS) in the University of Technology Sydney. The appointment is aimed at getting his contribution to the IPI research and publication. IPI then hosted a welcoming session online to introduce him to all the IPI staff. During the meeting, Prof. Biswajeet Pradhan gave an introduction of his university, current research, and future plan with IPI.







Date: 25 November 2020

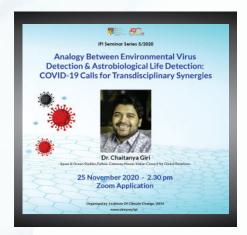
Medium: Online Zoom Meeting

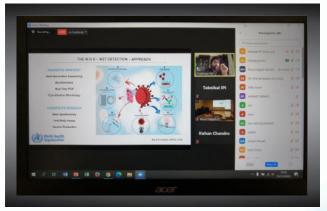
Organizer: Institute of Climate Change (IPI)

Speaker: Dr. Chaitanya Giri (Fellow Space and Ocean Studies Programme, Gateway

House, Indian Council on Global Relations)

With the success of organizing the third webinar in July 2020 during the movement control order by the government, IPI continued to organize the fourth webinar given by Dr. Chaitanya Giri, from Fellow Space and Ocean Studies Programme, Gateway House, Indian Council on Global Relations. Dr. Chaitanya Giri gave a talk on "Analogy Between Environmental Virus Detection & Astrobiological Life Detection: COVID-19 Calls for Transdisciplinary Synergies". About 70 participants from various universities and organizations joined the seminar.





IPI Seminar Series 6/2020: Distinguished International Professor Webinar Coupling Artificial Intelligence (AI) and Geospatial Computation for Natural Hazard Assessment

Date: 3 December 2020 (Thursday)

Medium: Zoom Online

Organizer: Institute of Climate Change (IPI)

Speaker: Professor Dr. Biswajeet Pradhan (University of Technology Sydney (UTS), Australia)

Following the appointment of Prof. Dr. Biswajeet Pradhan as the IPI distinguished international professor, Prof. Biswajeet Pradhan was then invited to gave a webinar entitled "Coupling Artificial Intelligence (AI) and Geospatial Computation for Natural Hazard Assessment", through the Zoom meeting and also live-streamed in the IPI official Facebook. About 87 participants from various institutions and organizations joined the seminar.





IKIM.fm Radio Program Broadcast (Man & Nature)

Man & Nature is a radio program broadcast in IKIM.fm radio station. UKM-YSD Chair for Climate Change sponsored 12 time slots starting from 8 November 2020 to 24 January 2021 on every Sunday night (6 pm). Nine experts from UKM were invited to share their knowledge and research results to the public in layman's terms. These shows talked about humans, nature, climate change, and how Islam deals with environmental problems. The Director of IPI was also invited by the programme as a special guest to talk on "Climate Change and the Critical Importance of Forest".

Below is a list of the episodes, speakers and topics for November and December 2020:

Episode 1 (8 November 2020): Air Pollution and Climate Change: The Critical Importance of Sustainable Waste Management by Prof. Ir. Dr. Mohd Sobri Takriff

Episode 2 (15 November 2020): Relationship between COVID-19 Pandemic and Air Quality by Prof. Dr. Mohd Talib Latif

Episode 3 (22 November 2020): Climate Action through Life Cycle Initiatives Assoc. Prof. Dr. Marlia Mohd Hanafiah

Epsiode 4 & 5 (29 November & 6 December 2020): Impact of Sea Level Rise on the Coastal Community by Assoc. Prof. Sr. Dr. Khairul Nizam Abdul Maulud

Episode 6 & 7 (13 December & 20 December 2020): Effects of Climate Change on Reptiles and Frogs by Prof. Dr. Norhayati Ahmad

Episode 8 (27 December 2020): The Miracle of Mangroves: Frontliner Against Climate Change of Tropical Countries by Assoc. Prof. Dr. Wan Juliana Wan Ahmad









RESEARCH COLLABORATION

Memorandum of Agreement (MoA) with Qatar University

IPI has established collaboration with Qatar University, by signing the Memorandum of Agreement (MoA) in the metamaterial research led by Associate Prof. Dr. Mohammad Rashed Iqbal Faruque. The agreement starts on 28 June, 2020 and ends on 28 June, 2022. They are currently working together in writing a research paper entitled "Enhancement of mechanical and corrosion resistance properties of electrodeposited Ni-P-TiC composite coatings" to be published in Scientific Reports (Nature Publishing Group).



Memorandum of Understanding (MoU) with Sant Longowal Institute of Engineering and Technology (SLIET), India

IPI has established collaboration with Sant Longowal Institute of Engineering and Technology (SLIET) in India, by signing Memorandum of Understanding (MoU) led by Prof. Ir. Dr. Mandeep Singh Jit Singh. The agreement starts on 1 September 2020 and ends on 31 August 2025. Future activities are in progress, such as research and publications related with communication.



INNOVATION

An NZRI metamaterial absorber for microwave and visible frequency regime

Project Members: Prof. Madya Dr. Mohammad Rashed Igbal Faruque, Prof. Ir. Dr. Mardina Abdullah, Prof. Dr. Mohammad Tarigul Islam, Mohammad Jakir Hossain

Status: Filed for Patent

Kit UKM-SIDPi

Project Members: Prof. Ir. Dr. Mardina Abdullah, Dr. Sabirin Abdullah, Prof. Dr. Lilia Bt. Halim, Prof. Madya Dr. Badariah Binti Bais, Prof. Madya Dr. Rosadah Binti Abd Majid, Dr. Nurul Shazana Binti Abdul Hamid, Dr. Gan Kok Beng, Dr. Siti Aminah Binti Bahari, Noridawaty Binti Mat Daud, Dr. Roslinda Binti Rosli, Nurul Hajijah Binti Hair

Status: Statutory Declaration



INTERNATIONAL RESEARCH GRANT



Assoc. Prof. Dr. Mohammad Rashed Igbal Farugue

Research Title: Functional Graded Nickel Based Nanocomposite Coatings for Oil and Gas Industry Granted by: International Research Collaboration Co-Fund (IRCC)

Assoc. Prof. Dr. Marlia Mohd Hanafiah

Research Title: Revitalizing green school actions for education for sustainable development (ESD) for 2030 focusing on climate change action as part of education response to covid-19 to build sustainable, peaceful, and resilience in Southeast Asia

Granted by: United Nations Educational, Scientific and Cultural Organization (UNESCO)



PROFESSIONAL MEMBERSHIP



Ts. Dr. Wan Shafrina Wan Mohd Jaafar

Appointed Body: Malaysia Board of Technologists Appointed as: Professional Technologist

Technology Field: Atmospheric Science &

Environment Technology (AC)

Date of Appointment: 10 September 2020



ACKNOWLEDGEMENT

Assoc. Prof. Dr. Mohammad Rashed Iqbal Faruque

Appointed Body: PiscoMed Publishing Pte Ltd Appointed as: Editorial Board Member (Insight-Physics)

Date of Appointment: 29 May 2020



ш

EXCELLENT THESIS & GRADUATE ON TIME (GOT)

Muhammad Khairul Adib Bin Muhammad Yusof (PhD)

Thesis Title: Hubung Kait Sifat Gempa Bumi dan Ciri Petanda Berdasarkan Kejanggalan Geomagent ULF

Main Supervisor: Prof. Ir. Dr. Mardina Abdullah (UKM)

Co Supervisor: Dr. Nurul Shazana Abdul Hamid (UKM) & Dr. Suaidi Ahadi (Indonesian Agency for

Meteorology, Climatology and Geophysics)





STUDENT HIGH IMPACT JOURNAL

Air Mohammad Siddiky, Mohammad Rashed Iqbal Faruque, Mohammad Tariqul Islam

Title: Double H-shaped complementary split ring resonator with different orientations for quad-band satellite applications

Journal: Results in Physics (Q1)

Air Mohammad Siddiky, Mohammad Rashed Iqbal Faruque, Mohammad Tariqul Islam, Sabirin Abdullah, Mayeen Uddin Khandaker

Title: Inverse double-C shaped square split ring resonator-based metamaterial with multi-resonant frequencies for satellite band applications

Journal: Results in Physics (Q1)







THESIS AWARD

Gold Awards, National-level Best Thesis of Higher Learning Institutions (Master) Siti Norsakinah Selamat

Main Supervisor: Prof Madya Sr Dr Khairul Nizam Abdul Maulud

Co-Supervisor: Prof. Ir. Dr. Othman Jaafar

Thesis Title: Penilaian Perubahan Garis Pantai dengan Menggunakan Teknik Sistem Analisis

Garis Pantai Digital (DSAS)

Awarded by: Ministry of Environment And Water

Award Date: 11 November 2020





Institute of Climate Change Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, MALAYSIA.

> Tel: 03-8911 8484/8482 Faks: 03-8921 6098

E-mel: pghikp@ukm.edu.my Website: http://www.ukm.my/ipi