



**UPM**

UNIVERSITI PUTRA MALAYSIA  
BERILMU BERBAKTI  
KAMPUS BINTULU SARAWAK



# E-PROCEEDING



**Green and Renewable Energy**

# GREEN

**International 2020  
e-Conference**

**18<sup>th</sup>-19<sup>th</sup> August 2020**  
**Webinar**

**“Current Status and Future  
of Renewable Energy”**

Organized by  
Universiti Putra Malaysia Bintulu Sarawak Campus

#UNSDG  
#UNSDGUPM  
#SDGUPM

4 QUALITY  
EDUCATION



**THE INTERNATIONAL E-CONFERENCE ON GREEN & RENEWABLE  
ENERGY 2020  
(GREEN 2020)**

18-19 August 2020

Universiti Putra Malaysia Bintulu Campus Sarawak (UPMKB)

*Published 2020*

Published by:

*Universiti Putra Malaysia Bintulu Sarawak Campus*

*P.O. Box 396, Nyabau Road,*

*97008 Bintulu, Sarawak, MALAYSIA*

URL Library UPM: <http://psasir.upm.edu.my/id/eprint/83485/>

URL UPM Bintulu: <http://green2020.upm.edu.my/>

The International e-Conference on Green and Renewable Energy (2020: Sarawak)

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

International E-Conference on Green & Renewable Energy (2020: Sarawak) E-PROCEEDING: THE INTERNATIONAL E-CONFERENCE ON GREEN & RENEWABLE ENERGY 2020 (GREEN 2020), 18th-19th August 2020, Universiti Putra Malaysia Bintulu Campus Sarawak (UPMKB)/ Editors: Juniza Md Saad, Woon Wai Cheong, Omar Faruqi Marzuki, Mark Lee Wun Fui, Shafinah Kamarudin, Nurul Nadwa Zulkifli, Rosli Ismail, Nor Mariah Adam.

Mode of access: Internet

e-ISBN 978-967-12140-8-4

1. Clean energy--Congresses.
  2. Renewable energy sources--Congresses.
  3. Power resources--Congresses.
  4. Government publications--Malaysia.
  5. Electronic books.
  - I. Juniza Md Saad. II. Woon, Wai Cheong.
  - III. Omar Faruqi Marzuki. IV. Lee, Mark Wun Fui.
  - V. Shafinah Kamarudin. VI. Nurul Nadwa Zulkifli.
  - VII. Rosli Ismail. VIII. Nor Mariah Adam.
  - IX. Title.
- 333.794



---

*The view and concepts presented are those of the authors. No responsibility is assumed by the organizer for any injury and/or damage to persons or property as a matter of product's liability, due to negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.*

Universiti Putra Malaysia Bintulu Sarawak Campus, 2020

## Table of Contents

**Biodiesel Production from Crude Karanja Oil using Heterogenous Catalyst from Seashells**

*A.A. Saleh, H. Dewi and H. Sinin* (pp. 1 - 11)

**An Affordable Calibrated Hot Box-Heat Flow Meter Suitable for Thermal Performance Measurement of an Insulation Panel**

*Hasila Jarimi and Yixin Wang* (pp. 12 - 20)

**Preliminary Experimental Study of Passive Solar Air Heating System in Drying Chilli under Malaysian Climates**

*Abdalla Abdur Rahman Shahbal and Khai Mun Ng* (pp. 21 - 30)

**Propect Evaluation of a Wind Farm Project for a Smart Campus in the Federal University of Kashere, Gombe State**

*Michael C. Ohakwere-Eze, Righteous Ombu, Udo A. A. and Mela S. Shimo* (pp. 31 - 40)

**Mechanical and Morphological Properties of Different Natural Fiber Reinforced Polylactic Acid Composites: A Review**

*S.F.K. Sherwani, S.M. Sapuan, Z. Ieman, E.S. Zainuddin and A. Khalina* (pp. 41 - 47)

**A Review on Green Cleaning During and Post Covid-19 Pandemic**

*A. Kamaruddin, N.N Zainol and M. A. Sulaiman* (pp. 48 - 58)

**Experimental Estimation of Water Velocity in a Selected Unregulated River (River Dindima) for Micro-hydrokinetic Potential**

*Michael C. Ohakwere-Eze, Righteous Ombu, James Audu, James Emmanuel and Henry I. Ikeri* (pp. 59 - 67)

**The Impact of Green Spaces on Residential Property Values in Malaysia**

*M.A Sulaiman, N.H Hashim, N.N Zainol, M.N Alias and W.Z Wan Yusoff* (pp. 68 - 77)

**Theoretical Framework and Future Directions of Green Human Resource Management on Employee Engagement**

*A. Vinothini* (pp. 78 - 92)

**Does Environmental Knowledge Moderate the Relationship Between Household Determinants' Intention to Practise Solid Waste Segregation-at-source? A Conceptual Paper**

*K.W. Cheng, S. Osman, Z.M. Jusoh and J.L. Lau* (pp. 93 - 104)

## BIODIESEL PRODUCTION FROM CRUDE KARANJA OIL USING HETEROGENOUS CATALYST FROM SEASHELLS

A.A. Saleh<sup>1</sup>, H. Dewi<sup>1</sup> and H. Sinin<sup>1</sup>

<sup>1</sup>Department of Mechanical and Manufacturing Engineering, Universiti Malaysia Sarawak  
94300 Kota Samarahan, Sarawak, Malaysia.

\*Email: aasaleh@unimas.my

Phone: +6082583299; Fax: +6082583410

### ABSTRACT

Gradual depletion of the world's petroleum reserves and impact of environmental pollution caused by combustion of fossil fuel, the search for substantial alternative energy resources such as biodiesel has gained importance. Biodiesel is a green fuel derived from plant oils or animal fats and consisting of long-chain fatty acid esters. In this study active calcium oxide catalyst was synthesized from *Meretrix Lyrata* (*M.Lyrata*) following calcination-hydration-dehydration technique. The catalytic feasibility of synthesized CaO was investigated in production of Karanja methyl ester (KME) from crude Karanja oil (CKO). KME was synthesized through esterification using  $H_2SO_4$  followed by transesterification utilizing CaO in a two-step reaction process of CKO and methanol. The *M.Lyrata* shells were calcined at 900°C and the catalyst samples were characterized by using FTIR, SEM, PSA, and BET-BJH spectrographic techniques. A maximum FAME conversion of 97.3% was obtained at optimum reaction conditions include methanol to oil ratio of 12:1, catalyst concentration of 2% wt, reaction temperature of 58 °C and reaction time of 2 h. In comparative study with the commercial CaO, *M.Lyrata* showed a higher catalytic activity. The catalyst reusability experiments ascertain reusability of CaO up to four reuse cycles had shown good efficiency. The economic comparative study confirms that CaO derived from *M.Lyrata* can be used as an alternative and feasible catalyst for the biodiesel production. The KME fuel properties were comply according to EN-14214 biodiesel fuel standards.

**Keywords:** Seashells, heterogenous catalyst, transesterification, Karanja biodiesel, Spectroscopy.

### INTRODUCTION

Biodiesel, also known as fatty acid methyl ester (FAME) or fatty acid ethyl ester (FAEE) can be obtained from vegetable oils or animal fats [1]. The rapid depleting of fossil fuel, demand of engine fuels that has growing tremendously and unpredictable in the availability lead to be the crucial factor to explore on alternative renewable fuel sources that able to supplement fossil fuels[2]–[4]. In recent years, biodiesel had shown exciting potential and receiving worldwide attention where it is known as a substitute for petro-based diesel fuel. Biodiesel has been known for its sustainability, non-toxic, biodegradability, less gaseous pollutant emissions and easy usability as fuel to be used in conventional diesel engines without any major modifications as compared to petroleum diesel[5]. Production of biodiesel was over 5 billion gallons in 2010.