ADVANCES IN COMPOSITE MATERIALS

Iskandar Idris Yaacob
Md Abdul Maleque
Zahurin Halim

IIUM Press
Published by:
IIUM Press
International Islamic University Malaysia

IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia        Cataloguing-in-Publication Data

Iskandar Idris Yaacob, Md Abdul Maleque & Zahurin Halim: Advances in Composite Materials.

ISBN: 978-967-418-231-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by:
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
# Table of Content

**Chapter 1**  
A Critical Review of Metal Matrix Composite Brake Rotor  
*Md Abdul Maleque*  
1

**Chapter 2**  
Technology of Moulding for Composite Auto Brake Rotor  
*Md Abdul Maleque*  
7

**Chapter 3**  
Fabrication of Nickel Aluminide (Ni$_3$Al) by Hot Isostatic Pressing (HIP)  
Faizal Abu Zarim, Iraj Alaei, I.I. Yaacob  
13

**Chapter 4**  
Investigation of Mechanically Alloyed Nd-Fe-B Powder  
I.I. Yaacob and H.K. Jun  
17

**Chapter 5**  
Synthesis And Characterization Of Nanocrystalline Ni$_3$Al Intermetallic Produced by Mechanical Alloying And Reaction Synthesis  
*R. Ismail and I.I. Yaacob*  
23

**Chapter 6**  
The Effect of Hard Nanofillers on Mechanical Properties of PVC Nanocomposites  
*Noorasikin Samat, Muhammad Alif Mohd Yusoff and Mohd Shahrul Rizal Bin Zakaria*  
29

**Chapter 7**  
Fatigue Fracture Mechanism of PVC/CaCO$_3$ nanocomposite  
*Noorasikin Samat, Alan Whittle and Mark Hoffman*  
34

**Chapter 8**  
Mechanical Behaviour of Eco Core Composite Sandwich Structure  
*Norhasnidawani Johari, Safiyah Hazwani Abd. Rahim and Zahurin Halim*  
40

**Chapter 9**  
Characteristics of Oil Palm Biomass via Mixture of Empty Fruit Bunch (EFB) Fiber and Mesocarp Fiber  
*Zahurin Halim, Nabiha Mohd Noh and Nurshazana Mohamad*  
45

**Chapter 10**  
Mechanical Behaviour of Oil Palm Empty Fruit Bunch (OPEFB) Albumen-Composites Concrete  
49
Chapter 11
The Influence of Biopolymer and Natural Fiber on the Physical and Mechanical Properties of Cement Composite

Norshahida Sarifuddin and Zuraida Ahmad

Chapter 12
Thermal and Morphological Study of Biopolymer Cotton-Albumen Clay (BCAC) Composites

Zuraida Ahmad, Teoh Swin Le and Kumaran A/L Samannamuthaliar

Chapter 13
Effect of Compaction Time on the Properties of Coir Fiber Reinforced Cement-Albumen Composite

Amir Zakwan Roslin, Nur Humairah A. Razak and Zuraida Ahmad

Chapter 14
Oil Palm Empty Fruit Bunch (OPEFB) for Lightweight Composites Concrete

Afiqah Omar, Nur Humairah A. Razak and Zuraida Ahmad

Chapter 15
Fabrication of Metal Matrix Composite Automotive Brake Rotor (Part 1)

Md Abdul Maleque

Chapter 16
Fabrication of Metal Matrix Composite Automotive Brake Rotor (Part 2)

Md Abdul Maleque

Chapter 17
Wear of Aluminium Matrix Composite – Effects of Reinforcement Combination

Md Abdul Maleque and Rezaul Karim

Chapter 18
Mechanical Properties of Wood Plastic Composites

Ooi Chong Jin and Shahjahan Mridha

Chapter 19
Properties of Wood Fiber Reinforced Polypropylene Composite

Shahjahan Mridha and Nafis Sarwar Islam
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>The effects of chemical and mechanical treatments on coir fibre to mechanical properties of coir-albumen-concrete</td>
<td>Zuraida Ahmad and Nurizan Omar</td>
<td>108</td>
</tr>
<tr>
<td>22</td>
<td>Variation of Fiber Architecture on Loads applied in Fabrication of Epoxy/Woven Fiber Glass Composite</td>
<td>Ahmed Nazrin Md Idriss and Shahjahan Mridha</td>
<td>119</td>
</tr>
<tr>
<td>23</td>
<td>Impact Behavior of Carbon/ Epoxy Composite in Moisture and Temperature environments</td>
<td>Shahjahan Mridha</td>
<td>125</td>
</tr>
<tr>
<td>24</td>
<td>Impact Strength Behaviour of the Woven and Chopped Fiber Glass Composites at Different Temperatures</td>
<td>Ahmed Nazrin Md Idriss and Shahjahan Mridha</td>
<td>132</td>
</tr>
<tr>
<td>25</td>
<td>An Investigation of Hybrid Composites Tubes Subjected to Quasi-Static Loading</td>
<td>Farrah Yussof and Zuraida Ahmad</td>
<td>138</td>
</tr>
<tr>
<td>26</td>
<td>Mechanical Behaviour of Biopolymer Cotton Albumen Clay (BCAC) Composites</td>
<td>Teoh Swin Le, Kumaran A/L Samannamuthaliam and Zuraida Ahmad</td>
<td>144</td>
</tr>
<tr>
<td>27</td>
<td>The Effect of Processing Parameters on Tensile Properties Empty Fruit Bunch (EFB) Fiber Reinforced Thermoplastic Natural Rubber Composites</td>
<td>Noor Azlina Hassan, Norita Hassan, Sahrim Hj. Ahmad and Rozaidi Rasid</td>
<td>150</td>
</tr>
<tr>
<td>28</td>
<td>Manganese Doped Hydroxyapatite Powder through Hydrothermal Method</td>
<td>Asep Sofwan Faturrohman, Alqap, Iis Sopyan and Nuar Izzati Mazmaa</td>
<td>155</td>
</tr>
</tbody>
</table>
Chapter 29
Synthesis and Characterization of Sol-Gel Method Derived Zinc Doped Hydroxyapatite Powder

Asep Sofwan Faturohman Alqap, Nor Hidayu and Iis Sopyan

Chapter 30
Synthesis and Characterization of Nickel Iron–Silicon Nitride Nanocomposite

Iskandar I. Yaacob

Chapter 31
Fabrication of Nickel Aluminide Intermetallic-Alumina Nanocomposite

Roslina Ismail and Iskandar I. Yaacob

Chapter 32
Investigation on the Effect of Water Immersion on Cotton Albumen Composite

Zahurin Halim, Zuraida Ahmad and Fauziah Md Yusof

Chapter 33
Numerical and Experimental Investigation of Peel Strength of Composite Sandwich Structures

Zahurin Halim, Shahnor Basri and Mohd Ramli Ajir

Chapter 34
Finite Element Analysis of Interlaminar Stresses in Edge Delamination

Zahurin Halim and Meer Mohd. Adli Taib