

**ADVANCES
IN MATERIALS
ENGINEERING**

Volume 2

**Edited By:
Md Abdul Maleque
Iskandar Idris Yaacob
Zahurin Halim**



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Table of Content

Chapter 1		Page
Amorphous Coating of Iron Nickel Alloy		1
		Suryanto
Chapter 2		
Characterization of Electroplated Nanocrystalline NiFe Alloy Films		7
	Yusrini Marita and Iskandar I. Yaacob	
Chapter 3		
Corrosion Behavior of Zinc in Potassium Hydroxide Aqueous Solution		13
		Suryanto
Chapter 4		
Development of Carbon Doped TiO ₂ Photocatalyst for Pigment Degradation		19
	Muh Rafiq Mirza Julaihi, Asep Sofwan Faturohman Alqap and Iis Sopyan	
Chapter 5		
Dynamic Mechanical Analysis of Carbon Fibre Composites		25
	Hazleen Anuar, Sahrim Hj. Ahmad and Rozaidi Rasid	
Chapter 6		
Effect of Composition on Phase Transformation of Iron-Platinum Nanoparticles		31
	Koay Mei Hyeie and Iskandar I. Yaacob	
Chapter 7		
Effect of Nanosized Alumina Reinforcement in Intermetallic Nickel Aluminide on the Formation of γ' Precipitates		37
	Roslina Ismail and Iskandar I. Yaacob	
Chapter 8		
Effect of Sintering Temperature on Protein Foaming-consolidation Porous Alumina-tricalcium Phosphate Composites		43
	Ahmad Fadli and Iis Sopyan	
Chapter 9		
Electrical Property of ITO Thin Film Deposited by Rf Magnetron Sputtering		49
	Agus Geter Edy Sutjipto, Nurul Hajar and Farah Diana	
Chapter 10		
Electrochemical Study of Zinc Selenide Thin Films Prepared for Photovoltaic Applications		55
	Souad. A. Mohamad, A. K. Arof	
Chapter 11		
Electrodeposited CdS / CdTe Solar Cells		61
	Souad. A. Mohamad	
Chapter 12		
Fabrication of Biomass Pellet from Mesocarp Fiber		65
	Zahurin Halim and Nurshazana Mohamad	
Chapter 13		
Fabrication of Kenaf Sandwich Panel		68
	Siti Khadijah Abdul Rahman and Zahurin Halim	

Chapter 14		
Foam Impregnation Method for Artificial Bone Graft Application		78
: Study on the Effect of Drying Time	Fariza Abdul Rahman and Zuraida Ahmad	
Chapter 15		
Foam Impregnation Method for Artificial Bone Graft Application		84
: Study on the Effect of Sintering Temperature	Zuraida Ahmad and Fariza Abdul Rahman	
Chapter 16		
FTIR Analysis - Aluminium Hydroxide Treated with Silane Coupling Agent		89
	Noorasikin Samat, Nor Suhaila Nor Saidi and Muhammad Saffuan Sahat	
Chapter 17		
Inorganic / Organic /Inorganic Double Junction Thin Film Solar Cells		92
	Souad. A. Mohamad	
Chapter 18		
Investigation on The Effect of Ultra Violet on Cotton Albumen Composite		96
	Zahurin Halim , Zuraida Ahmad and Fauziah Md Yusof	
Chapter 19		
Measurement of Oxygen Permeability in Bulk Alloys by Internal Oxidation of Dilute Constituent		100
	Mohd Hanafi Bin Ani and Raihan Othman	
Chapter 20		
Natural Dye Coated Nanocrystalline Tio ₂ Electrode Films for DSSCs		106
	Souad. A. Mohamad and Iraj Alaci	
Chapter 21		
Normal Deposition to Anomalous Deposition		109
	Suryanto	
Chapter 22		
Polymer Clay Nanocomposites: Part II- Synthesis of Polymer Nanocomposites		115
	Noor Azlina Hassan, Norita Hassan	
Chapter 23		
Production of Porous Calcium Phosphate Ceramics through Polymeric Sponge Method		120
	Asep Sofwan Faturohman Alqap, Nur Ain Rakman, and Iis Sopyan	
Chapter 24		
Silicone Doped Calcium Phosphate Powder Synthesized via Hydrothermal Method		126
	Asep Sofwan Faturohman Alqap, Iis Sopyan and Zuria Farhana Kushaili	
Chapter 25		
Stress Analysis of Backend Metallization		132
	Iskandar I. Yaacob and Goh Chia Lan	
Chapter 26		
Study on Metal Removing from Alumina Ceramics		137
	Agus Geter Edy Sutjipto and Muhyiddin Bin Budah@Udah	

Chapter 27		
Surface Quality of <i>Dipterocarpus Spp</i> under Tropical Climate Change: Effect of Pre-Weathering		146
	Mohd Khairun Anwar Uyup, Hamid Hamdan, Paridah Mat Tahir, Hazleen Anuar, Noorasikin Samat, Siti Rafidah Mohamed	
Chapter 28		
Surface Topography of Sulphuric Treated Carbon Fibre		151
	Hazleen Anuar, Sahrim Hj. Ahmad and Rozaidi Rasid	
Chapter 29		
Synthesis and Characterization of Electrodeposited Iron-Platinum Nanostructured Thin Films		157
	Seoh Hian Teh and Iskandar I. Yaacob	
Chapter 30		
Synthesis of Magnetic Nanoparticles in Water-in-Oil Microemulsions		164
	Iskandar I. Yaacob	
Chapter 31		
The Effect of R-ratio on Fatigue Crack Propagation in Plasticised PVC and Modified PVC		170
	Noorasikin Samat, Alan Whittle and Mark Hoffman	
Chapter 32		
The Effect of R-ratio on Fatigue Crack Propagation in Un-plasticized PVC and Modified PVC		175
	Noorasikin Samat, Alan Whittle and Mark Hoffman	
Chapter 33		
Thin Film of Indium Tin Oxide and Its Deposition Technology Deposition		180
	Agus Geter Edy Sutjipto, Sugrib Kumar Shaha	
Chapter 34		
X-ray Photoelectron Studies on the Surface Chemical States of Yttria-Stabilized Zirconia Thin Film in Aqueous Acid Hydrofluoric		186
	Sukreen Hana Herman, Mohd Hanafi Ani, and Susumu Horita	
Chapter 35		
ZnO / Polymer Junction Growth for Hybrid Solar Cell Applications		194
	Souad. A. Mohamad	

Surface Topography of Sulphuric Treated Carbon Fibre

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Abstract. Surface treatment of carbon fiber is essential to improve interfacial bonding between fibers and matrix. In this chapter, short carbon fibre (CF) was subjected to 1M sulphuric acid treatment and then refluxing with 1M sodium hydroxide (NaOH). The effects of oxidative treatment on CF were observed under scanning electron microscope (SEM) and atomic force microscope (AFM). SEM micrograph revealed the rough surface of Sulphuric treated CF. The formation of roughed surface and deeper pitting/grooves as compared to untreated short carbon fibre was supported by AFM image on sulphuric treated carbon fibre.

Introduction

The interlaminar shear strength of carbon fibre reinforced composites is related to the fibre-matrix interfacial bonding. The bond can be in the form of physical which is due to mechanical interlocking between the fibre-matrix or chemical bonds between the matrix and the active sites on the fibre surface. The active sites are located at the edges of the crystallite basal planes emerging at the surface, structural defects such as vacancies, dislocations or steps in the basal planes oriented parallel to the fibre axis [1]. Mechanical interlocking is determined by fibre surface area, the surface porosity and surface roughness. The fibre surface morphology is dependent on the precursor material where polyacrylonitrile (PAN)-based fibres exhibited smaller surface area with smooth surface and circular cross section.

Oxidative surface treatment of carbon fibres has been found to lead a considerable improvement in mechanical properties of fibres. The surface treatment, changes the surface chemistry of the carbon fibres and is the key factor that affects the final mechanical properties of the composite. The main purpose of surface treatment is to modify the inert nature of carbon fibre surfaces. The changes caused by the treatment applied and the interface between the carbon fibre surface and matrix material can be monitored by surface science method [2].

The surface topography of PAN based carbon fibre is comprised of many wrinkles or ridges running along the fibre axis [3]. The crystal basal surfaces of completely bonded carbon atoms are rather chemically inert. Hence, the more chemically active sites on a graphite crystal surface are located at incompletely bonded edges and faults in the structure [4]. This graphitic and the aligned fibre's, resulted in less potential for chemical bonding.