

**ADVANCES
IN MATERIALS
ENGINEERING**

Volume 2

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



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

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

ISBN: 978-967-418-168-0

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
TEL: +603-6188 1542 / 44 / 45 FAX: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

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FTIR analysis – Aluminium Hydroxide Treated with Silane Coupling Agent

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Keywords: Silane coupling agent, Aluminum hydroxide, Nanoparticles.

Abstract. In this chapter, the aluminum hydroxide (ATH)(Al(OH)₃) nano-particles were modified with 3-aminopropyltriethosilane (APTES). The modified ATHs were characterized with FTIR. The result showed the presence of amine functional groups in the modified ATH.

Introduction

One of the main function of inorganic particles is as reinforcement. They are available both in micron and nano-sized. The reinforcement of polymer with inorganic particles in nano size is getting attention due to the resultant nanocomposites exhibit enhanced mechanical and thermal properties as compared to conventional fillers (in micron size) [1]. Since the size of nano-particle decreases tremendously, hence its surface area is very high. As a result, the nano-sized particle will agglomerate. If this characteristic remains, thus the benefits of nano-sized particles will not be fully exploited particularly in fabrication of nanocomposites.

Compatibility between organic polymer and inorganic nanoparticle can be improved with coupling agent [2]. This is achieved by adding compatibilizer or modification via chemical treatments such as silane [3] and titanate [4-5]. Nevertheless, the silane coupling agents are the most useful type of modifier agent. Many previous studies reported that the modification of nanoparticles surface with silane, resulted in better nanoparticles dispersion. This is due to silane promoted the interaction between the nanoparticle and polymer matrix.

In this chapter, the effectiveness of silane coupling agent in modifying the surface of aluminum hydroxide (ATH) is studied. Analysis is conducted via FTIR analysis.

Experimental Procedures

Materials

Aluminum hydroxide (ATH) was supplied by Nanostructured & Amorphous Materials Inc., USA and the particle size is 50 nm. And silane coupling agent (3-Aminopropyltriethosilane) was obtained from Fisher Scientific (M) Sdn Bhd.

Surface modification

The surface modification of HA was carried in solution. A certain amount of ethanol and water was mixed up for ten minutes prior to the addition of coupling agent and this solution was stirred for 15 minutes. Next the ATH was added to the solution of silane agent. This slurry was stirred for 1 hr with at a speed of 300 rpm. The reaction product was then was filtered to obtain the modified powder. And lastly, the surface modified ATH was dried for 2 hr in an oven at 60°C.