UNIVERSITI TEKNOLOGI MARA

MECHANICAL PROPERTIES OF PPNANOCLAY/PP AND OPEFB/PPNANOCLAY/PP COMPOSITES

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CONFIRMATION BY PANEL OF EXAMINERS

I certify that a panel of examiners has met on 27th October 2014 to conduct the final examination of Noorrul Wahida Binti Abdul Razak on her Master thesis entitled "Mechanical properties of ppnanoclay/pp and opefb/ppnanoclay/pp composites" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The Panel of Examiners was as follows:

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ABSTRACT

Recently, there has been a resurgence of interest in the use of natural fibres as reinforcements in plastic for the production of low-cost and lightweight polymer composites due to their good mechanical performance and perceived environmental advantages. However, their limitations such as large scattering in mechanical properties, and insufficient understanding of mechanisms controlling their mechanical behavior and failure modes, still confine the use of natural fibre reinforced composites in non-structural applications. Hence the principal aim of this project was to achieve a better understanding of the various parameters that contribute to the mechanical properties and fracture surface, and to manipulate these parameters in order to improve and produced PPnanoclay/Polypropylene (PP) reinforced oil palm empty fruit bunch (OPEFB) composite material. Thus, in this study the oil palm empty fruit bunch fibre were used as filler and PPnanoclay/PP composite was act as the matrix material. Several characterization techniques such as tensile test, impact test, flexural test and water absorption analysis were used to assess the effect of each parameter with several numbers of OPEFB sizes (180 μm, 250 μm, 300 μm, and 355 μm). PPnanoclay/PP composites were compounded at three different PPnanoclay loading of 5 phr, 7 phr and 10 phr. From the all testing, 7 phr of PPnanoclay loading shows the best formulation composite compared to others for both PPnanoclay/PP composites and OPEFB/PPnanoclay/PP hybrid composites. Further investigation on the effects of OPEFB size in OPEFB/PPnanoclay/PP hybrid composites showed that the 355 μm size gave the most mechanical properties enhancement. The improvement due to mechanical properties and decrease of water uptake was revealed a good bonding between filler and matrix at also 355 μm. This study was also revealed that the best formulation of PPnanoclay content is at 10 phr for treated fibres of composites.

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CHAPTER ONE
INTRODUCTION

This chapter represents the project background, problem statement and project objectives to give an overview on this dissertation. Through this chapter also, it concisely discussed on the project scope or limitations of this project and end up with the expected significant contribution to new knowledge.

1.1 RESEARCH BACKGROUND

This work was inspired according to the previous researches being done which states on potential of natural fibre reinforced plastic. Natural fibre composites, which are defined as composite materials containing of natural fibre and thermoplastic materials are one of the family in composite materials. Basically, composites are one of the widely used materials due to their adaptability with different applications. Besides, because of the relative ease of combination with other materials made composites are most chosen which they can serve specific purpose and exhibit desirable properties [1]. A balance between performance properties and cost of composite is possible to achieve which could not be obtained by any single kind of reinforcement. The combinations of composition consist of the high mechanical and physical performance of the fibres, the appearance, bonding and physical properties of polymers. During the past decades, material scientists, researchers and industries were attracted to natural fibres because of their specific advantages. Environmental issue was the main subject that alarming present scenario of the world. Therefore, these natural fibres also known as bio-based fibres, which are biodegradable, have gain more concerns rather than conventional or synthetic fibres. Moreover, high stiffness, low density, uncomplicated processes, environmental safety, non-corrosive, reduced dermal and respiratory irritation have increased the interest in using the natural fibres with various available synthetic and natural polymeric materials [2-4] replacing to some extent more expensive and non-renewable synthetic fibres such as glass especially in low pressure laminating. Natural fibres that are intensively investigated such as flax, hemp, jute, kenaf, wood flour, ramie, sisal, oil palm empty fruit bunch, banana fibres, pineapple leaf fibre and papyrus [3, 5-7,] have showed potential