MECHANICAL PROPERTIES OF CALCIUM CARBONATE AND COCONUT SHELL FILLED POLYPROPYLENE COMPOSITES

MEHDI HEIDARI

UNIVERSITI TEKNOLOGI MALAYSIA
MECHANICAL PROPERTIES OF CALCIUM CARBONATE AND COCONUT SHELL FILLED POLYPROPYLENE COMPOSITES

MEHDI HEIDARI

A thesis submitted in partial fulfillment of the requirements for the award of the degree of Master of Science (Polymer Technology)

Faculty of Chemical Engineering
Universiti of Technologi Malaysia

OCTOBER 2012
Special dedication to my beloved family and friends...
Thanks for the love, support and memories
ACKNOWLEDGEMENT

In the name of Allah and with His blessing and gracing has led my thesis successfully complete. I would like to deeply praise Allah for giving me strength in doing this research project.

First of all, I would like to express my sincere appreciation to my supervisor, Assoc Prof Dr Wan Aizan Wan Abd. Rahman for her encouragement and guidance throughout this thesis writing. I am also very thankful to other lecturers from Department of Polymer Engineering for their advices and critics, without their continued support and interest, this thesis would not been presented today.

I would like to express my credit to the Faculty of Chemical Engineering technicians, Mr. Azri, Mr. Suhee Tan, Mr. Nordin, and Ms. Zainab for being so generous and helpful in assisting, advising and their willingness to sacrifice their valuable time supporting me by any mean not only during this semester but also throughout my study.

Finally, I would like to thanks my parents, for their motivation and financial support and the endless love. Thank you.
ABSTRACT

Natural lignocellulosics and mineral fillers have an outstanding potential as reinforcement in thermoplastics. This study deals with the preparation of coconut shell lignocellulosic and calcium carbonate mineral filler composites by reactive extrusion processing in which good interfacial adhesion is generated by a coupling agent of maleic anhydride. Polypropylene (PP) matrix was modified by reacting with maleic anhydride and subsequently bonded to the surface of the modified lignocellulosic component, in-situ. The PP was extruded with the fillers to form the compatibilized composite. These composite blends were then injection molded for mechanical characterization. Typical mechanical tests like tensile strength, flexural strength and Izod impact energy were performed and the results are reported. Also water absorption test was performed to assess the absorption value of moisture in the composite. Tensile properties of coconut shell and calcium carbonate filled polypropylene composites was increased and also the impact strength and elongation at break were increased too. Water absorption of PP filled coconut shell was increased significantly. These finding are discussed in view of the improved adhesion resulting from reactions and enhanced polar interactions at phase boundaries. The mechanical properties indicate that these fillers are desired as reinforcement for making a good composite.
ABSTRAK