UNIVERSITI TEKNOLOGI MARA

EVALUATION THE DEGREE OF GRAFTING ON OPMF, SiO2 BIOCOMPOSITE

MUHAMMAD NUR SIDEK BIN ABDUL SAMAD

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Table of Contents

CHAPTER ONE

1.0 INTRODUCTION

1.1 Research Background

Natural fibre is a knid of hair like raw material that can be directly obtained from an animals, vegetables, or mineral sources. The fibre is converted into nonwoven fabrics such as felt or paper or, after spinning into yarns and into woven cloth. Although nature abounds in fibrous materials, especially cellulosic types such as cotton, wood, grains, and straw only small number can be used for textile products or other industrial purposes. In economic considerations, fibre is useful for commercial purposes is determined by such properties as length, strength, pliability, elasticity, abrasion resistance, absorbency, and various surface properties. Other than that, they are in elastic condition which can stretch when tension is apply. Then, they will partially or completely return to their original shape or length when the tension is released. [Britannica ,2018]. They also are getting attention from researchers to utilize in polymer composites due to their eco-friendly nature and sustainability. The interest or an idea for the natural fibres as reinforcing material in composites primary have get an attention the past decades ago due to environmental concerns and also awareness of limiting petroleum resources to produce petroleum-based synthetic polymers. Additionally, it is related to adding value to agricultural products and solve environmental problems rise from agricultural products residue.

The copolymerisation of ethylene with higher olefins is a commercial prominence for manufactures of linear low-density polyethylene (LLDPE) and elastomer. (Chaichana et al.. 2007). LLDPE is well-known for the extensive application in many purpose for instance in the manufacturing of plastic film. Nevertheless, due to LLDPE's shortcomings their usage become limited. This is because LLDPE has low thermal resitance, low mechanical strength and also poor optical properties. It is known that LLDPE has taken much interest in the manufacturing of plastics. These plastics can be derived to be made as pipes, food wrapper and so forth. China has taken the initiative to replace their conventional plastic micro-irrigation pipes with LLDPE plastic for the purpose of saving the water in the rural area, specifically in the northwest China (Lei *et al.*, 2006). Hence, it is vital to design a high performance compound to be used as the

structure of the micro-irrigating pipes. However, LLDPE comes with the shortcomings such as poor flexibility and processability. The addition of some inorganic particles such as nano-SiO_2 has been found that it is able to enhance the physical and mechanical properties, processability, resistance to environmental stress cracking and aging behaviour of various polymers (Lei *et al.*, 2006). It is a fact that LLDPE is well-known for its broad application in the industry especially in the field of plastics films. This is due to the positive characteristics that LLDPE has which are having better mechanical properties than LDPE, higher tensile strength, elongation at break and also has greater resistance to puncture and tearing (Kurian, 1992). Moreover, the addition to the advantages of LLDPE are the chemical resistance and also thermal stability, having a lower friction and higher softening point as well as less costly than LDPE. Despite all these appealing advantages of LLDPE, it also comes with the drawbacks. An initiative is taken by blending LLDPE with additives purpose to enhance the properties of the polymers. The blending of polymer with filler, especially the inorganic material is proven to be one of the most effective method to produce the polymer composites (Jongsomjit *et al.*, 2005).

Oil palm mesocarp fibre (OPMF) is one of the potential natural fibres that can be used in bio-composites production. These fibres are lignocellulosic excess left over in the palm oil mill. There are 5.74 million hectares of palm oil were plant in Malaysia. It is make Malaysia become one of the country that has largest palm oil producing countries in the world. (MPOB,2016). There is 14 % of fibre content in palm fruit while 78% to 82% of the fruits is mainly biomass and moisture.