CHAPTER II

LITERATURE SURVEY

Maldas *et al.* (1988) studied polymer blends of polystyrene filled with sawdust wood fibers obtaining from both hardwood and softwood species. The suitability of sawdust wood residue as a filler for thermoplastics has been investigated by using two different mesh sizes (20 and 60mesh), as well as by varying the weight percentage of the fibers from 10% to 40%. The best mechanical properties of the polymer blends could be achieved with 60 mesh of 30% of fiber content. Moreover using of softwood sawdust as a filler in the polymer blends showed slightly better in reinforcing property than hardwood sawdust.

Klason *et al.*(1989) studied the effect of fiber concentration and fiber treatment on mechanical properties of thermoplastics reinforced with cellulose fibers. The improvement in the mechanical stiffness and strength was interpreted in term of disintegration of the fibers into submicroscopic microfibrils with high aspect ratio, high modulus and strength values. In order to obtain good mechanical properties of materials, not only good dispersion of fibers but also good adhesion between the fibers and polymer matrix played as important roles. Using an appropriate coupling agent and prehydrolysis of fibers could be responded for these two requirements.

Joseph and Thomas (1995) studied the effect of chemical treatment on tensile properties of sisal fiber-reinforced LDPE composites. Treatments using chemicals such as sodium hydroxide, isocyanate, permanganate and peroxide were carried out to improve the bonding at the fiber-polymer interface. In order to investigate the effect of types of chemical reagents, by fixing at 30% of fiber loading, alkaline treated fiber composites showed better tensile properties than untreated composites due to their rough surface topography and increased aspect ratio. CTDIC (cardanol derivative of toluene diisocyanate) treatment reduced the hydrophillic nature of the sisal fiber and thereby enhanced the tensile properties of the sisal-LDPE composites. The addition of 4% of peroxides was attributed to the peroxide induced grafting of PE on sisal fiber surfaces and resulted in improving of tensile properties. The improvement in tensile properties of the sisal-LDPE composite also obtained from using 0.055% of permanganate. Among the various treatments, peroxide treatment of fiber imparted maximum interfacial interactions.

Devi *et al.* (1997) investigated tensile, flexural and impact behavior of pineapple leaf fiber (PALF)-reinforced polyester composites as functions of fiber content, fiber length and fiber surface modification. The optimum length of the fiber required for achieving PALF/polyester composites of maximum properties was found to be 30 mm. The tensile properties and impact strength of these PALF/polyester composites increased linearity with the fiber weight fraction. But in the case of flexural strength, there was a leveling off beyond 30%. In addition, the best improvement was observed when using silane A-172 as a coupling agent for the blends.

Sain and Kokta (1994) studied the mechanical properties of the composite of polypropylene and chemithermomechanical pulp reactively treated with bismaleimide-modified PP. The results were compared with the properties of unmodified composites of PP and pulp. Premodifications of PP as well as pulp with m-phenylene bismaleimide provided a positive response with regard to the mechanical properties of the composites. The tensile strength of a 35% of pulp-filled PP composites was found to be much higher than that strength of pure PP. On the other hand, tensile strength decreased considerably with increase in the chemithermomechanical pulp content if unmodified PP was used.

Coutinho *et al.* (1997) prepared the polypropylene/wood fiber composites at the three different temperatures: 170 °C, 180 °C and 190 °C. The surface of wood fibers was modified through the use of silane coupling agents and coating with polypropylene. The fiber coating was performed by propylene polymerization in the presence of wood fibers or by immersion in an o-dichlorobenzene propylene solution. It was found that the composite treated with vinyl-tris (2-mehtoxy ethoxy) silane at 180 °C gave a best result in the tensile and flexural strength.

Rozman *et al.* (1998) compared the effect of the different types of compounding techniques, which were internal mixer and single-screw extruder on the mechanical properties of oil palm empty fruit bunch-polypropylene (EFB-PP) composites. For both types of composites, the incorporation of the EFB into PP matrix resulted in the improvement in the tensile modulus. However, the tensile strength, elongation at break and impact strength of the composites decreased with increasing filler loading. The composites produced by an internal mixer had displayed higher tensile strength, tensile modulus and impact strength than those produced by extrusion.

The better performance had been attributed to the effectiveness of the internal mixer, which produced better compounding and improved the wetting of the filler surfaces.

Rozman *et al.* (1998) studied the effect of the addition of lignin on the mechanical properties of rubberwood-polypropylene composites. Lignin was employed in the composite to serve as a bridging agent between polar wood filler and non-polar PP. Incorporation of lignin in the composite was able to improve the flexural and tensile properties of the composite. The tensile modulus was improved, especially at 5% lignin loading. However, no improvement was detected in the tensile strength.

Bhattacharya *et al.* (1995) compared the effect of starch containing different amylopectin to amylose ratios (the amylose content were 0, 50 and 70%), by fixing starch content at 60% by weight, on both styrene maleic anhydride copolymer (SMA) and ethylene-propylene-g-maleic anhydride copolymer (EPMA) matrix in term of mechanical properties and microstructure of these blends. Scanning electron micrographs showed that the starch phase in the starch/EPMA blend formed a cocontinuous phase with the rubber phase and the starch phase become finer as the amylopectin content increased. While the starch phase in starch/SMA blend dispersed in SMA phase at every the percent of amylopectin. For mechanical properties, both of the blends containing EPMA and SMA showed the same trend that tensile strength increased tensile strength at amylose content of 50% and then the strength decreased at amylose content of 70%.

Nakashima *et al.* (1996) prepared composite films by incorporating starch in the matrix of ultra high molecular weight polyethylene (UHMWPE). By varying PE-starch ratios to be 3:1, 1:1, 1:3 and 1:5, it was found that the drawability and tensile properties decreased with increasing starch content. The draw ratios of the films with 1:1 ratio and 1:5 ratio were 200 and 80, respectively. The tensile strength and the corresponding Young's modulus of the films 1:1 ratio were 1.7 and 75 Gpa, respectively. While tensile strength and the corresponding Young's modulus of the films with 1:5 ratio were 0.8 and 10 GPa, respectively.