ABSTRACT

Natural fiber reinforced thermoplastic composites have gained attention during the past decades in different technological applications due to their light weight, easy processability, cost reduction and improved mechanical properties. The improvement of the properties of the composites depends on the judicious choice of the reinforcements, their fraction, surface characteristics, degree of dispersion and its surface treatment which promotes interaction between the polymer matrix and the reinforcement. This thesis deals with the preparation of banana fiber reinforced polypropylene composites by novel commingling method. Chemical treatments were given to banana fiber to improve the interfacial bonding with polypropylene matrix. Solvatochromism and zeta potential measurements have been done to evaluate the acid-base characteristics of the untreated and chemically treated banana fiber. Influence of banana fiber loading and chemical treatments on thermal, water absorption, mechanical, dynamic mechanical, acoustic emission and environmental ageing of the commingled composites were investigated. The above studies revealed that the properties of the composite were dependent on banana fiber loading and chemical treatments given to the banana fiber. Commingled composites fabricated from the woven commingled fabric of polypropylene fiber and banana fiber showed superior mechanical properties when compared to short banana fiber commingled composites. Banana microfibrils were prepared from banana fiber by steam explosion process. The polarity of the microfibrils was investigated by solvatochromic and electrokinetic studies. It was observed that microfibril has higher acidity than the banana fiber. Effect of microfibril loading on the tensile properties of the commingled composites was analyzed. Finally, it is important to add that commingling is an excellent method for the preparation of value added products.