

Extraction and Characterization of Natural Cellulosic Fiber from Pandanus amaryllifolius Leaves

ABSTRACT

Pandanus amaryllifolius is a member of Pandanaceae family and is abundant in southeast Asian countries including Malaysia, Thailand, Indonesia and India. In this study, Pandanus amaryllifolius fibres were extracted via a water retting extraction process and were investigated as potential fibre reinforcement in polymer composite. Several tests were carried out to investigate the characterization of Pandanus amaryllifolius fibre such as chemical composition analysis which revealed Pandanus amaryllifolius fibre's cellulose, hemicellulose and lignin content of 48.79%, 19.95% and 18.64% respectively. Material functional groups were analysed by using Fourier transform infrared (FTIR) spectroscopy and X-ray diffraction analysis confirming the presence of cellulose and amorphous substances in the fibre. The morphology of extracted Pandanus amaryllifolius fibre was studied using a scanning electron microscope (SEM). Further mechanical behaviour of fibre was investigated using a single fibre test with 5 kN cell load and tensile strength was found to be 45.61 ± 16.09 MPa for an average fibre diameter of 368.57 ± 50.47 μm . Meanwhile, moisture content analysis indicated a 6.00% moisture absorption rate of Pandanus amaryllifolius fibre. The thermogravimetric analysis justified the thermal stability of Pandanus amaryllifolius fibre up to 210 °C, which is within polymerization process temperature conditions. Overall, the finding shows that Pandanus amaryllifolius fibre may be used as alternative reinforcement particularly for a bio-based polymer matrix.