UNIVERSITI TEKNOLOGI MARA

PREPARATION & CHARACTERIZATION OF PINEAPPLE LEAF FIBERS (PALF) / POLYETHYLENE TEREPHTHALATE (PET) NANOFIBERS VIA ELECTROSPINNING METHOD

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Pineapple Leaf Fibers (PALF) which is rich in cellulose, relatively inexpensive and abundantly available has the potential for polymer reinforcement. In this study, pineapple Leaf Fiber (PALF) and Polyethylene Terephthalate (PET) nanofibers electrospun mats were fabricated via the electrospinning method and the chemical, morphological, structural, wetting and thermal properties were studied. In order to achieve the main objective, PALF undergo pre-treatment to remove the lignin and hemicellulose content and reduce the diameter of PALF. FESEM results shows the decrease in electrospun PALF diameter from 91.6nm (raw PALF) to 51.6nm (treated PALF) thus conclude that pre-treatment PALF helps to produce finer and smoother surface morphological for the nanofibers. Six ratios of PALF/PET were prepared from pure PET, ratio 1/10, 1/7.5, 1/5, 1.3/1 and 1/1 and labelled as pure PET, PALFPET, PALFPET2 , PALFPET3 , PALFPET4 and PALFPET5 respectively. The chemical, morphological structural, wetting and thermal properties were studied using FESEM, FTIR, Contact angle, TGA and DSC respectively. FTIR studies were done to understand the interaction occurred between PALF and PET with increasing PALF ratio. From the FTIR result, increasing PALF showed similarities spectra with raw PALF peak at 1100cm-1 indicating the influence of PALF in the fibers. This peak did not appear at low PALF content. FESEM shows that increasing in PALF percentage reduced the fiber diameter from 96.37nm to 43.62nm, however, highest PALF ratio at PALFPET5 started to shows formation of branch and rough nanofibers. Contact Angle revealed that increasing the PALF content simultaneously increased the ability of nanofibers to adsorb water as shown by lower contact angle degree with 81.6° and adsorption time of 15 seconds. An increase in the PALF ratio did not change the peak position in XRD and no new peaks observed for any sample. However, the peak at 23° for samples PALFPET4 and PALFPET5 with higher PALF ratio exhibited higher intensity compared to that of pure PET. Thermal properties obtained from TGA results suggested that thermal properties were not influenced by PALF ratio. Overall, PALF/PET electrospun nanofibers produced for PALFPET4 displayed the optimum performance.

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