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Characterizations and biodegradability of solvent casting halloysite nanotubes/sago starch nanocomposite (Article)

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Abstract

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The incorporation of nanofiller into bio-based matrixes has gain attention so as to produce a bio-nanocomposite. This approach aids in enhancing the properties of the bio-based matrixes whilst maintaining the environmental friendliness of the nanocomposite. Thus, this paper reports on the characterizations of thermoplastic sago starch (TPSS) which was reinforced with halloysite nanotubes (HNT) to form a bio-nanocomposite. The nanocomposite at varying HNT contents (0, 0.25, 0.5, 1.0, 3.0 and 5.0 wt.%) was fabricated by solvent casting technique. The effect of HNT content on the nanocomposite was studied for its crystallinity, chemical functional groups, thermal analysis and biodegradability. X-ray diffractograms (XRD) revealed higher crystallinity of the nanocomposite as compared to the TPSS. The nanocomposite spectrum, as characterized by Fourier Transform Infrared Spectroscopy (FTIR) showed the presence of Si-O groups of HNT at absorption bands of 1117 cm^{-1}, 1027 cm^{-1} and 1007 cm^{-1}. FTIR also revealed the occurrence of interaction between HNT and starch matrix. Addition of HNT also improved the thermal stability of the nanocomposite with increasing of HNT content. Biodegradability of the nanocomposite, however, reduced at higher HNT content after 60 days of soil burial. Thus, it is concluded that the addition of HNT enhanced the strength of TPSS film and at the same time, easily degraded when dispose into the landfill that make it suitable as biodegradable wound-healing materials. © School of Engineering, Taylor's University.

SciVal Topic Prominence

Topic: Kaolinite | Nanotubes | halloysite nanotube

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