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M.N. Prabhakar, Jung-Il Song



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Fabrication and characterisation of starch/ chitosan/flax fabric green composites

M. N. Prabhakar, and Jung-Il Song

Department of Mechanical Engineering, Changwon National University, Changwon, Korea

*Corresponding author: dr_prabhakar@changwon.ac.kr

ABSTRACT

The study reveals the fabrication of eco-friendly bio-composites by employing natural, widely available biopolymers such as starch, chitosan (CS) and flax fabric (FF). In a typical process, starch was used in the form of thermoplastic starch prepared via mechano ball milling and subsequently, composites were fabricated via compression with CS and FF. The nature of the composites was analysed using FTIR. Good compatibility and homogeneous dispersion of reinforcements was corroborated using FESEM (EDX). The influence of CS on the mechanical (UTM) and thermal (TGA) properties, biodegradability (soil burial test), and flammability (horizontal burning test (UL94), limited oxygen index (LOI)) of the composites was investigated. An improvement in the mechanical and thermal stability properties of the composites was observed. UL94 and LOI showed remarkable withstandability of the composites with flame and flame self-annihilate respectively. The flame-retardant properties of the composites were speculated to arise from the dense char formed by the carbonaceous agent CS. A delay in biodegradation was observed for CS composites, indicating longer durability of the composites.

Keywords: Starch; Chitosan; Flax fabric; Biodegradability; Mechanical properties; Flame retardancy.

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