

Investigation of alkaline surface treatment effected on flax fibre woven fabric with biodegradable polymer based on mechanical properties

ABSTRACT

Biodegradable polymers such as polylactic acid (PLA) are used nowadays due to their degradability, durability and environmentally friendly properties. Alkaline surface treatment of natural fibres is used to increase the flexural properties of composites. This research investigated the flexural properties of dry compressed PLA, wet mix PLA, untreated flax/PLA and treated flax/PLA composites. The flax fibre was first treated with NaOH. The wet mix PLA was prepared via solvent casting with chloroform and dried at room temperature overnight followed by post-drying in an oven. The flax/PLA composites were fabricated using a hot press for 6 minutes. The wet mix PLA showed higher flexural strength compared to the dry compressed PLA. The treated flax fibre composite showed higher flexural strength compared to the untreated flax fibre. The flexural strength and elongation at break of the treated flax fibre composite was increased by 4.79% and 27.76%, respectively, while the flexural modulus decreased by 0.79% compared with the untreated flax composite. The treated flax composite also showed an improvement in impact properties, increasing its impact strength by about 3% and 10% at energy levels of 10 J, 15 J, and 17.5 J compared with the untreated flax fibre. Therefore, the investigation of the surface treatment of flax in a PLA matrix based on its mechanical properties revealed better properties compared to untreated flax/PLA composite.

Keyword: Fibre surface treatment; Natural fibre; Biodegradable polymer; Thin film