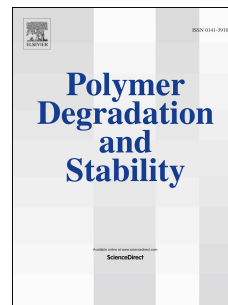


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Coupled Hydro-Mechanical Aging Of Short Flax Fiber Reinforced Composites

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ABSTRACT

One of the challenges in the widespread use of biocomposites for engineering applications is the influence of environmental conditions on their mechanical properties, particularly for a combination of aging factors such as temperature, moisture, and mechanical stresses. Thus, the purpose of this paper is to study the influence of coupled aging factors by focusing on a 100% bio-based and biodegradable composites made of flax/poly(lactic acid) with several fiber contents. The development of a specific testing setup enabled continuous in-situ measurements and allowed comparing the effects of combined aging factors to those of uncombined aging factors. It was confirmed that the aging temperature in wet conditions led to a loss of elastic properties, especially for higher fiber fractions. While creep tests in dry conditions resulted in little decrease of elastic properties, it was observed that mechanical loading of the materials combined with water immersion resulted in a strong synergistic effect on the loss of stiffness. Finally, the presence of fibers reduced environmental stress cracking mechanisms and increased the time to failure.

Keywords: Durability; Flax; Short-fibre composites; Hygrothermal effect; Creep test

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