

## Static Characterization of a Bio-Based Sandwich in a Humid Environment

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**Abstract :** Industries' attention has been drawn to green and sustainable materials as a result of the present energy deficit and environmental damage. Sandwiches formed of auxetic structures made up of periodic cells are also being investigated by industry. Several tests have emphasized the exceptional properties of these materials. In this study, the sandwich's core is a one-cell auxetic core. Among plant fibers, flax fibers are chosen because of their good mechanical properties comparable to those of glass fibers. Poly (lactic acid) (PLA), as a green material, is available from starch, and its production process requires fewer fossil resources than petroleum-based plastics. A polylactic acid (PLA) reinforced with flax fiber filament was employed in this study. The manufacturing process used to manufacture the test specimens is 3D printing. The major drawback of a 100% bio-based material is its low resistance to moisture absorption. In this study, a sandwich based on PLA / flax with an auxetic core is characterized statically for different periods of immersion in water. Bending tests are carried out on the composite sandwich for three immersion time. Results are compared to those of non immersed specimens. It is found that non aged sandwich has the ultimate bending stiffness.

**Keywords :** auxetic, bending tests, biobased composite, sandwich structure, 3D printing

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