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# SUSTAINABLE MATERIALS: SYNTHESIS OF BIO-BASED MATRIX WITH SIMULTANEOUS FORMATION OF LIGNOCELLULOSIC FIBERS REINFORCED COMPOSITES

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This study investigates the production of bio-based composites synthesized through the development of a hybrid matrix consisting of bio-based polyester-polyether. The reagents employed in this process include epoxidized soybean oil (OSE), sodium lignosulfonate (NaLs), citric acid, and lignocellulosic fibers, which encompass coconut fiber mats, short coconut fibers, sisal fiber mats, and short sisal fibers for reinforcement. The synthesis reactions occurred within a metal mold under 3 tons of pressure, at a temperature of 120°C for 7 hours. Subsequent analyses of the composites were performed using thermogravimetric analysis, dynamic mechanical analysis, flexural, and impact tests. The findings indicate that the composites exhibit outstanding thermal stability, characterized by a decomposition onset temperature of approximately 300°C and a maximum decomposition rate of nearly 420°C. The tan delta peak suggested that the glass transition temperature (Tg) of all composites is approximately 7°C, i.e., below room temperature. The materials did not fracture under flexural or impact forces. The composite reinforced with short sisal fibers exhibited a higher flexural modulus compared to that reinforced with the woven sisal mat, indicating that short fibers result in stronger adhesion at the fiber-matrix interface. The preliminary results of this study highlight potential applications for these composites, including packaging, automotive interiors, and sports equipment, among others.

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