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Exploring the recycling potential of HDPE films reinforced with flax fiber for making sustainable decorative tiles

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ABSTRACT

The goal of the research was to assess the recycling potential of waste high-density polyethylene (HDPE) films taken as reinforcement with natural fibers to fabricate decorative tiles with improved mechanical properties. Initially, the density of the composite was determined. Further, hardness, quasi-mechanical and impact properties were evaluated for the HDPE/natural fiber composite samples by testing the composites tensile, flexural loads and impact. In addition, to evaluate the thermal characteristics of the composite, thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) study were performed. Water absorption and sound absorption properties were determined for industry specific applications. Scanning Electron Microscopic analysis (SEM) was performed for analyzing the microstructure and also HDPE matrix and natural fibers bonding exists in the composite. The findings confirmed that adding natural fibers to the HDPE matrix impressively increased both tensile and flexural strengths by up to 25%. The impact strength was also enhanced by up to 38%, whereas the hardness and density values remained relatively unchanged. Improved interfacial bonding between the HDPE matrix and natural fibers had been identified by SEM analysis, which was a factor in the composite material's enhanced mechanical characteristics. These findings suggest that waste HDPE

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