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Silk Fiber Reinforced High Density Polyethylene Matrix

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It can be seen from literature survey that the majority of the research were carried out on high-density polyethylene reinforced with plant and mineral fibers for evaluating its mechanical and tribological characteristics. Our study mainly focuses on incorporation of natural fibers along with nanoclay by varying the percentage of high-density polyethylene matrix, prepared via melt mixing method. The blends prepared were then compressed to thin sheets of size 150 x 150 x 2 mm^3 in the compression molding machine at pressure and temperature of 200 MPa and 160°C respectively, for 120 min followed by water cooling for 30 min. The effect of variation in high-density polyethylene content on the mechanical and tribological properties of the composites were studied using tensilometer and pin-on-disc test setup, respectively. The composites were also characterized for density, hardness, surface roughness and functional group identification respectively. It is observed that with the addition of 20 wt% silk fiber along with 1 wt% nanoclay in the high-density polyethylene matrix yielded improved results in terms of higher strength and modulus as well as good slide wear resistance along with low friction characteristics as compared to other composites. The results obtained have been assessed with the tensile fractured and wear damage morphology using scanning electron microscopy.