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Synergistic reinforcement of polyamide-based composites by combination of short and continuous carbon fibers via fused filament fabrication

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Abstract

The aim of the present work was to study the synergistic reinforcement, by short and continuous carbon fibers, of polyamide-based composites. The three-phase composites were obtained by the fused filament fabrication process where short fiber reinforced polyimide was deposited/printed along with continuous carbon fibers in a layered structure. The properties of the continuous carbon fiber tows and short carbon fiber reinforced polyamide tows were first evaluated by means of morphological, thermal and mechanical tests. The effects of stacking sequence of laminates as well as the effects of both short and continuous fibers' contents, on the mechanical properties of laminated composites, were carefully analyzed by considering several layering configuration. The results showed that the synergistic reinforcement of laminates by both short and continuous carbon fibers was indeed superior to the individual carbon fiber reinforcement for the tensile strength but not for the elastic modulus. The tensile properties of the laminated composites were higher when the stacked continuous

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