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The Degradation of Mechanical Properties Caused by Acetone Chemical Treatment on 3D-Printed PLA-Carbon Fibre Composites

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Abstract:

The paper presents the effect of short-term acetone chemical treatment on PLA-carbon fibre composite mechanical properties, manufactured using the fused deposition modelling (FDM) technique. In this research, PLA-carbon fibre's tensile and dynamic mechanical properties were studied for six different treatment time (0, 60, 100, 120, 180, 220 s). The results suggested that retained acetone significantly reduced the mechanical properties of the PLA-carbon fibre as the treatment time increased. The maximum decrease in tensile strength was observed for the sample treated in acetone for 220 s. The tensile strength decreases about 62% compared to the untreated PLA-carbon fibre composite sample in acetone. SEM images revealed that acetone caused a plasticization effect and caused porosity that acts as a stress concentrator to the composites hence lowering mechanical properties.