

Effect of Volume Fraction of Fibre on the Mechanical Properties of Nanoclay Reinforced E-Glass-Epoxy Composites

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Abstract : E-glass-epoxy laminated composites having different fiber volume fractions (40, 50, 60 and 70) were fabricated with and without the addition of nanoclay. Flexural strength and tensile strength of the composite laminates were determined. It was observed that, with increasing the fiber volume fraction (Vf) of fiber from 40 to 60, the ability of nanoclay to enhance the tensile and flexural strength of E-glass-epoxy composites decreases significantly. At 70Vf, the tensile and flexural strength of the nanoclay reinforced E-glass-epoxy were found to be lowest when compared to the E-glass-epoxy composite made without the addition of nanoclay. Based on the obtained data and microstructure of the tested samples, plausible mechanism for the observed trends has been proposed. The enhanced mechanical properties for nanoclay reinforced E-glass-epoxy composites for 40-60 Vf, due to higher interface toughness coupled with strong interfilament bonding may have ensured the homogeneous load distribution across all the glass fibers. Results in the decrease in mechanical properties at 70Vf, may be due to the inability of the matrix to bind the nanoclay and glass-fibers.

Keywords : e-glass-epoxy composite laminates, fiber volume fraction, e-glass fiber, mechanical properties, delamination

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