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Addition of nanoclay and compatibilized EPDM rubber for improved impact strength of epoxy glass fiber composites

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ABSTRACT

Epoxy-glass fiber reinforced nanocomposites containing compatibilized ethylene propylene diene monomer (EPDM) rubber were processed for improved impact strength. Nanocomposites were reinforced with 1.0 weight percent of nanoclay and 2.5–10.0 weight percent of EPDM (both untreated and compatibilized). Compatibilization was done using two treatments: silane treatment and UV-assisted maleic anhydride grafting (MAH). SEM-EDS and FTIR confirmed EPDM treatment. SEM of fractured impact specimens was done to study effect of compatibilization on interfacial adhesion of nanocomposite constituents. XRD and TEM determined clay morphology in nanocomposites. EPDM concentration of 5.0 weight percentage resulted in maximum impact strength. For nanocomposites reinforced with silane treated EPDM, maximum improvement in impact strength was 68%, with a small drop in tensile properties. For MAH grafted EPDM, improvement in impact strength was 26%, but tensile properties recovered. Cavitation of rubber particles and improved interfacial