



EFFECTS OF THE ADDITION OF POLY(ETHYLENE-CO- METHYL ACRYLATE-CO-GLYCIDYL METHACRYLATE) TO GLASS-FIBER/EPOXY LAMINATES FOR SELF-HEALING PURPOSES

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Abstract: Composite materials with self-healing ability are receiving increasing interest as an approach to extend the life and improve safety of composites' structures [1]. Self-healing thermoset matrix based composites with thermoplastic additives have been reported in the literature. During a healing cycle, the thermoplastic material is delivered to the fracture plane of the damaged composite [2]. In this study, poly(ethylene-co-methyl acrylate-co-glycidyl methacrylate) (E-MA-GMA) particles were added to glass fiber-epoxy laminates and the effects of addition of these particles were evaluated. Samples were evaluated by scanning electron microscopy (SEM) in order to investigate the interaction of the additive to the epoxy material. Dynamic mechanical analysis (DMA) was performed in order to evaluate changes in viscoelastic properties due to the addition of E-MA-GMA. Fourier transform infrared (FTIR) spectroscopy was used to evaluate chemical alterations in the composite due to the addition of the thermoplastic. SEM images suggested a strong adhesion between the E-MA-GMA and the epoxy matrix, which produced an adhesive layer between epoxy and the thermoplastic in the laminate. The addition of the thermoplastic did not alter significantly the viscoelastic behavior of the laminates. Finally, the self-healing ability was evaluated by interlaminar shear strength (ILSS) tests.

References:

[1] Sordo, F.; Michaud, V.; Processing and damage recovery of intrinsic self-healing glass fiber reinforced composites, *Smart Mater. Struct.* 25 (2016) 084012 (9pp) [2] Meure S, Furman S, Khor S. Poly[ethylene-co-(methacrylic acid)] healing agents for mendable carbon fiber laminates. *Macromol Mater Eng* 2010;295(5):420–4

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