GNP Films Embedded Glass Fiber Reinforced Composites for Enhanced Impact Performance

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Graphene-based 2D materials offer an ideal platform for developing multifunction laminated composites, which have a promising role in improving many mechanical properties without compromising weight. Lightweight films produced from graphene nano-platelets (GNPs) can be embedded within a fiber reinforced composite for enhanced multifunctionality and improved mechanical performance. Herein, a facile approach is used for fabricating glass fiber reinforced polymer (GFRP) composites with enhanced impact properties using high concentrations (>1 wt.%) of GNP surface films embedded with 3D GFRP composites. The low-velocity impact (LVI) testing was performed for three samples including pristine GFRP, 2 wt.%, and 5 wt.% GNP-GFRP composites at 50 J energy level to evaluate the performance of multifunctional composites and the LVI results of current work is compared with previous published work. Furthermore, it was found that polymeric GNP film-embedded GFRP composites had improved the impact performance (maximum peak force) and absorbed energy as compared to pristine 3D GFRP samples. It is anticipated that the proposed 3D GFRP laminated composites based on GNP films can be used in the aerospace industry for many structural and functional applications.

References

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Figures

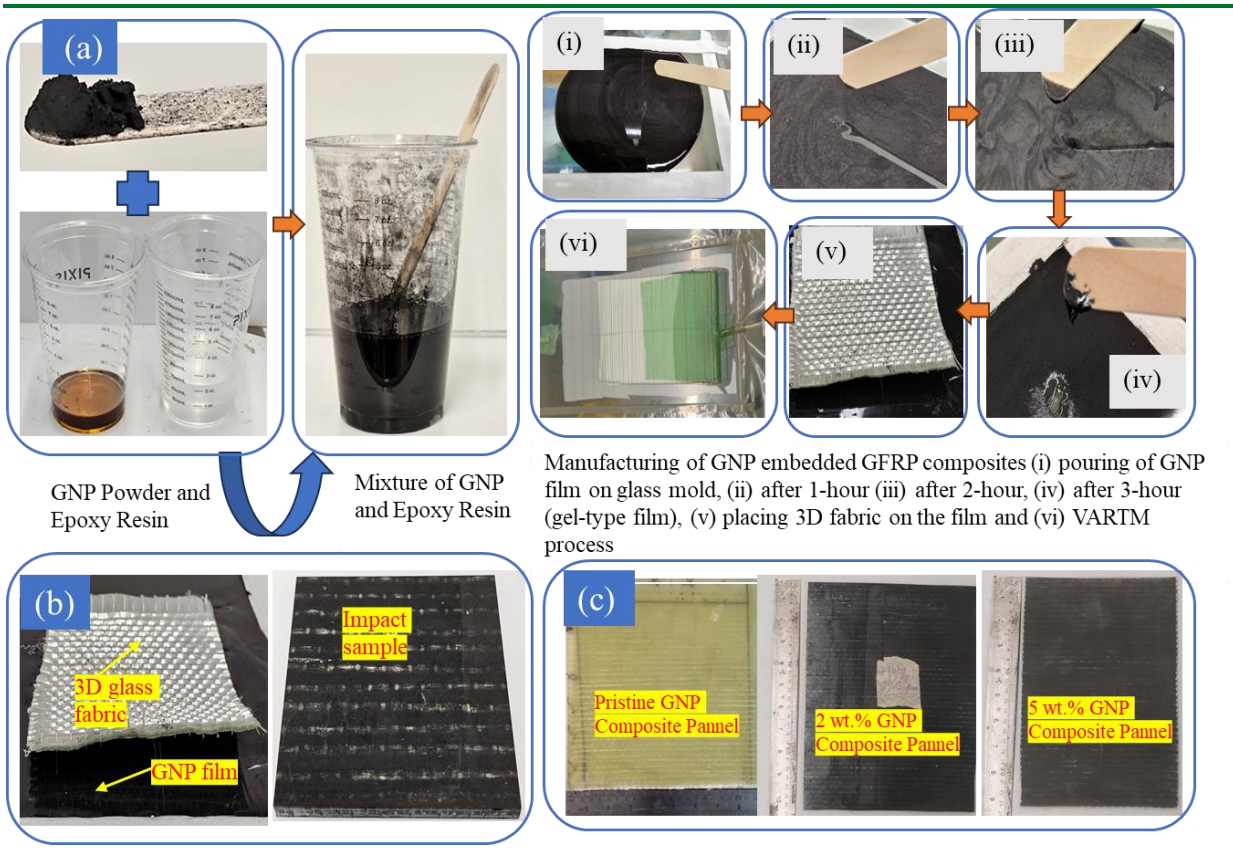

Figure 1. (a) Detailed GNP film manufacturing process, (b) GNP films co-cured with 3D GFRP composites, (c) Various weight percentage GNP film embedded 3D GFRP composites.