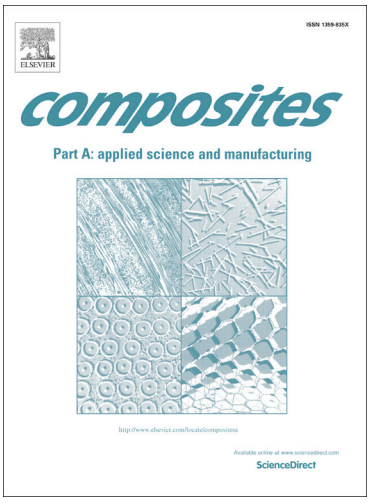

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PII: S1359-835X(17)30461-X
DOI: https://doi.org/10.1016/j.compositesa.2017.12.023
Reference: JCOMA 4872

To appear in: *Composites: Part A*

Received Date: 9 August 2017
Revised Date: 5 December 2017
Accepted Date: 21 December 2017

Please cite this article as: Mahmood, H., Vanzetti, L., Bersani, M., Pegoretti, A., Mechanical properties and strain monitoring of glass-epoxy composites with graphene-coated fibers, *Composites: Part A* (2017), doi: https://doi.org/10.1016/j.compositesa.2017.12.023

Mechanical properties and strain monitoring of glass-epoxy composites with graphene-coated fibers

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Abstract

An engineered interphase can improve the mechanical properties of epoxy/glass composites simultaneously inducing a piezoresistive response. To prove this concept, E-glass fibers were coated with graphene oxide (GO) by electrophoretic deposition, while reduced graphene oxide (rGO) coated fibers were obtained by subsequent chemical reduction. The fiber-matrix interfacial shear strength measured by the single-fiber fragmentation test increased for both GO and rGO coated fibers. Unidirectional composites with a high content of both uncoated and coated fibers were produced and mechanically tested under various configurations (three-point bending, short beam shear and mode-I fracture toughness, creep). Composites with coated fibers performed similarly or better than composites prepared with uncoated fibers. Finally, composites with rGO coated fibers were tested for their piezoresistive response under both static and dynamic conditions. The electrical resistance changed proportionally to applied strain thus confirming the possibility of using composites with rGO coated fibers as strain sensors in load-bearing components.

Keywords: A. Glass fibres; B. Fibre/matrix bond; B. Fragmentation; B. Mechanical properties.

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