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Multifunctional Graphene Oxide Paper Embodied Structural Dielectric Capacitor based on Carbon Fibre Reinforced Composites

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Abstract

In this study, the multifunctionality of structural dielectric capacitor made by integrating graphene oxide paper into carbon fibre reinforced composite has been investigated. The study is based on an earlier work on the use of graphene oxide for dielectric material in the structural dielectric capacitor, in which electrical properties have been characterised. In this work, an in-depth study on electrical and mechanical properties of this kind of structural dielectric capacitor have been carried out. In addition, the multifunctional efficiency of structural dielectric capacitors were evaluated and compared with existing structural dielectric capacitors. Through experiments, it is revealed that both electrical and mechanical properties of the structural dielectric capacitors were significantly enhanced by interleaving a graphene oxide paper in the middle of composite. Therefore, the multifunctional efficiency of this kind of structural dielectric capacitors has been ultimately improved, indicating the excellent potential of graphene oxide paper in the development of multifunctional materials for energy storage, potentially for high-strength required applications, such as electric vehicles and unmanned aerial vehicles.

Keywords: Carbon fibres; Functional composites; Smart materials; Electrical properties; Mechanical properties

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