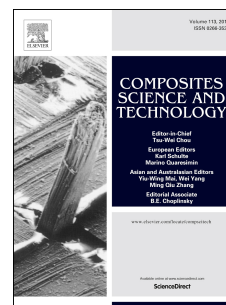


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Magnetic and electrically conductive epoxy/graphene/carbonyl iron nanocomposites for efficient electromagnetic interference shielding

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Abstract

Magnetic and electrically conductive epoxy nanocomposites are fabricated by compounding thermally reduced graphene oxide (TGO) and magnetic carbonyl iron (CI) using a solvent-free and efficient centrifugal mixing method. The addition of TGO sheets not only forms an interconnected conducting network within the epoxy matrix, but also prevents the aggregation of heavy CI components. The incorporation of CI components leads to obvious increases in permeability, magnetic loss, and electromagnetic interference (EMI) shielding properties. Among different shapes of CI components, spherical CI particles result in the best EMI shielding performance. The ternary nanocomposites exhibit excellent shielding effectiveness (>36 dB within 9.5-12 GHz) and a maximum value of ~40 dB at 11.7 GHz, much higher than that (~20 dB) of epoxy/TGO nanocomposite with the same content of TGO. Wave absorption loss is confirmed to be the main EMI shielding mechanism for the epoxy nanocomposites. The high EMI shielding performance makes the epoxy nanocomposites promising for EMI shielding applications.

Keywords: A: Polymer-matrix composites (PMCs); A: Functional composites; B: Electrical properties

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