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A Novel Type of Radar Absorbing Materials: Hard Ferrite- Graphene Nanocomposites

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Extended Abstract

The rapid evolution of high-speed digital electronics, wireless communications, industrial, medical, and increasing exposure to microwaves necessitates the development of effective, compact, and economical absorbers of electromagnetic energy to ensure electromagnetic compatibility and ecological safety in a wide frequency range. Ferrites possess a unique combination of high permittivity, spontaneous magnetization, and extremely low d.c. conductivity for developing wideband absorbers. Graphene, a new two-dimensional carbon-based material with one-atom thickness, has recently stimulated worldwide interest owing to its excellent electrical and thermal conductivity, superior mechanical property, as well as large surface area as shown by He et al (2013).

Herein, we report a novel in situ method to efficiently decorate expanded graphite (EG), expanded graphite oxide (EGO) and reduced expanded graphite oxide (rEGO) sheets with *barium* and *strontium* hexaferrite nanoparticles for the first time. (EGO) was firstly synthesized by oxidizing graphite with acid via the modified Hummers method. Then, the oxidized material was exfoliated in water with the treatment of ultrasonication. The exfoliated GO was followed by reduction with hydrazine hydrate to produce graphene (reduced exfoliated GO sheet) aqueous dispersion. Hard ferrite particles have been synthesized by citrate sol–gel combustion route at 1200 ◦C with initial Fe/Ba molar ratio 12. A range of analytical techniques, X-ray powder diffraction, Raman spectra, scanning electron microscopy and vibrating sample magnetometer were used to demonstrate the successful attachment of hard ferrite nanoparticles to graphene sheets.

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References

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