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Effect of dielectric loss on microwave shielding behaviour of graphene based nanocomposite

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Recent developments in personnel, commercial and military applications are causing electromagnetic interference to brother devices and causing problems to mankind. Therefore an electromagnetic shield is required to overcome this problem. The ideal shielding material should possess high aspect ratio, optimum conductivity, high complex permittivity and permeability. Graphene is a 2-dimensional material with high conductivity and good thermal and electrical properties and Cobalt ferrite as soft magnetic material with large saturation magnetization and high permeability values over GHz range are used in this research work. Graphene has been prepared by liquid exfoliation method and $CoFe_2O_4$ was prepared by hydrothermal method. The graphene-$CoFe_2O_4$-Polypyrrole (Gn-CF-Ppy) nanocomposite was synthesized by in-situ oxidative polymerization using FeCl3 as oxident. The structure and morphology were studied by X-ray diffraction, transmission electron microscopy and RAMAN spectroscopy. The total shielding effectiveness of nanocomposite is found to be 39 dB at 2mm thickness in X-band (8.2-12.4GHz) frequency range. With increase in thickness of pallet, the shielding effectiveness due to absorption increases and shielding effectiveness due to reflection decreases.

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