Electromagnetic interference (EMI) shielding and microwave absorption properties of nickel ferrite NiFe2O4/ PANI-PTSA nanocomposite

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Abstract
The Nanocrystalline nickel ferrite & conducting polymer {NiFe2O4/PANI-PTSA} was prepared by {sol-gel/ chemical oxidative polymerization} method. Morphology analytical techniques for the nanoparticle size structure of the specimens {{NiFe2O4/PANI-PTSA} = NF, PNF1, PNF2, and PNF3}, were characterized by X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR) and vector network analyzer (VNA). The electromagnetic absorption properties (R.L) of the nanocomposite that aggressively depend on the complex relative for both the permittivity (εr′–jεr″) and the permeability (μr′–jμr″) have been calculated from scattering parameters (S11and S21) using the Nicholson–Ross–Weir method as a function of frequencies. Results showed that the specimen PNF3-(3:1), 2.1 mm thickness provide best absorption of reflection loss (R.L); – 19.5 dB (99 % power absorption) at 8.3 GHz, – 25.19 dB (> 99.68% power absorption) at 9.5 GHz, and – 59.086 dB (99.99 % power absorption) at 10.7 GHz, and hence this nanocomposite can be used as an excellent electromagnetic interference (EMI) for shielding and microwave absorption such as radar or other various military applications in X-band (8-12 GHz).

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