DIELECTRIC AND ELECTROMAGNETIC INTERFERENCE SHIELDING PROPERTIES OF ZN/MWCNT/EPOXY COMPOSITE MATERIALS

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The increasing prevalence of electronic devices in modern society has heightened the importance of materials that can effectively shield against electromagnetic radiation. As electronic devices become more compact and sophisticated, the need for lightweight, efficient, and multifunctional shielding materials becomes critical.

Composites with various carbon nanoinclusions and multi-walled carbon nanotubes (MWCNTs) in particular have been widely studied in the last decade [1,2]. They offer superior electrical conductivity and mechanical strength, enhancing the overall shielding effectiveness and durability of the composite. The addition of Zn nanoparticles that possess excellent dielectric properties will not only contribute to the material's ability to store and dissipate electrical energy increasing its conductivity by several orders but can also provide a synergistic effect [3] when added to MWCNT-based composites.

This study focuses on investigating the dielectric properties in a wide temperature range and electromagnetic interference shielding (EMI SE) properties of composite materials made of Zn nanoparticles (Zn, 99.9%, 95-105 nm, USNano) and MWCNTs (>95%, OD:10-20nm, USNano) at varying concentrations, and epoxy resin as a polymer matrix. It was demonstrated that hybrid Zn/MWCNT/epoxy composites are suitable for electromagnetic shielding applications at filler concentrations above the percolation threshold.

References

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