

EMI shielding materials based on Polystyrene/Graphene foam-based composites

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Abstract: Living in the exponential technological growth of electronic devices, including networking devices and antennas, a serious problem of electromagnetic interference (EMI) and radiation comes to light. Recent scientific focus in material science is to develop EMI shielding materials to reflect, absorb, or redirect electromagnetic waves, in order to prevent interference from affecting sensitive equipment. The subject of this work is to develop lightweight polymer foams capable of mitigating electromagnetic interference, based on polystyrene (PS) foam filled with carbonaceous fillers such as graphite and thermally expanded graphene (Gther.exp.). The studied foam-based composites were prepared on a semi-industrial line using conventional CO₂ foaming. Structural and shielding characterization was performed using SEM, FTIR-ATR, TGA/DSC, four-probe conductivity, and EMI measurements. The obtained results point out that carbon-based reinforcements can simultaneously improve the thermal stability, electrical conductivity, and EMI shielding capability of the studied systems, providing a scalable platform for further microstructural and compositional optimization toward higher-performance EMI shields.

Keywords: EMI shielding, polystyrene (PS), thermally expanded graphene, graphite