

Microwave Absorbing Properties of Flaky Fe-Si-Al Alloy Powder-Rubber Composites

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The frequency profile of complex permeability (μ_r) and permittivity (ϵ_r) and their relationship with microwave absorbing properties are investigated in soft magnetic metal-polymer composite material. The Fe-Si-Al alloy powders were forged by attrition mill to get flaky shape. The composite sheet was fabricated in which flaky powders are dispersed in polymer and aligned in the direction perpendicular to electromagnetic wave propagation. The suppressing efficiency of the electromagnetic noise depends on the combination of a soft-magnetic-metallic powder and a polymer. We found that dielectric loss (ϵ'') spectra for composite sheets can be controlled by combining of the aspect ratio of flaky powder and content of filler. The permittivity (ϵ') of magnetic composite is increased as aspect ratio increasing, while the permeability is decreased slightly. The maximum attenuation peak of reflection loss is shifted to lower frequency range as aspect ratio increasing, and the value of maximum attenuation peak is to get smaller gradually. From these result, we could designed a noise absorber sheet ($t=1.0$ mm) for quasi-microwave band, which is impedance matched at 1.4 GHz with respect to -8.2 dB reflection loss.