

Core loss improvement of Fe metal powder Coated with Alumina oxide by sol-gel method

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In recent years, the soft magnetic composites (SMC) have attracted great interest as the potential applications in electromagnetic circuits, induction field coils and magnetic field shielding. Among AC losses of metal powder. The eddy current loss has been effectively reduced by an insulation-coating to increase electrical resistivity on the magnetic metal powder. For the same purpose, we have tried to fabricate a core-shell layer composed of a Fe powder and Al_2O_3 shell layer by the sol-gel method. In this study, we investigated the influence of coating time on the magnetic properties of the Fe powder. To evaluate the core losses of samples, the toroidal cores were fabricated by mixing Al_2O_3 -coated Fe powder with a resin. The microstructural analysis and the magnetic properties of Fe powder coated with Al_2O_3 were conducted using field emission-scanning electron microscope (FE-SEM), transmission electron microscope (TEM) and Inductance analysis and B-H curve analyzer.

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