

Magnetic properties of TiO₂-coated Fe powder

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Iron (Fe) metal powder is a soft magnetic material with high saturation magnetization and low coercivity. For this reason, it has been used as the material of cores of inductors and transformers for high frequency applications. However, the eddy current is generated because of metallic property of Fe under AC field and, at high frequencies, it becomes a critical issue. It has been reported that insulating coating on soft magnetic powder can be used for a barrier of inter-particle eddy current paths under AC magnetization. The core-shell structure of TiO₂-coated Fe powder was fabricated to minimize the eddy current in this study. TiO₂-coating on Fe powder was enabled by a sol-gel method using titanium but oxide (TBOT) as the precursor. The coating parameters, such as the coating time and the concentration of TBOT, were controlled to achieve a uniform coating layer of TiO₂ on the Fe particle surfaces. Magnetic properties of TiO₂-coated Fe powder, including permeability and Q factor, will be presented for a discussion.

Keywords: Fe metal powder, TiO₂ coating, insulating coating, eddy current loss