

Magnetic Properties and Dispersion Stability of Carbon Encapsulated Fe Nano Particles

Young Rang UHM and Chang Kyu RHEE*

Nuclear Materials Research Division, Korea Atomic Energy Research Institute (KAERI), Daejeon 305-353, Korea

Hi Min LEE

Plant Engineering Center, Institute for Advanced Engineering (IAE), Yongin 449-863, Korea

Chul Sung KIM

Department of Nano-electro Physics, Kookmin University, Seoul 136-702, Korea

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Carbon-encapsulated Fe nanoparticles were synthesized by using levitational gas condensation (LGC). The morphologies of the carbon-coated Fe nanocrystallites were characterized by using transmission electron microscopy (TEM). All as-made materials were composed of nanocapsules with a uniform particle size at and below 10 nm. The nanocapsules consisted of outer carbon layers of multi-shell. Mössbauer spectroscopy revealed that the carbon-coated Fe nanoparticles were made of α -Fe, γ -FeC, and Fe₃C. The magnetization curves were measured at 60 and 300 K. The hysteresis loop demonstrated that the carbon-coated metal nanocrystallites exhibited a superparamagnetic behavior. The dispersion stability of the solvent increased in the following order: water, ethanol, and ethylene glycol. Flocculation due to a coalescing reaction between the nanoparticles was insignificant due to carbon layers on the surfaces of the nanoparticles.

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