Oxidation Effect in Cobalt Nanoparticles Magnetic Fluids

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Cobalt nanoparticles were synthesized by modified thermal decomposition and oxidized in the condition of solution. Crystal structure of fabricated cobalt nanoparticles is determined to be cubic of *Fm-3m* space group from X-ray diffraction (XRD) measurement. Microstructure of cobalt nanoparticles after the oxidation process show core-shell structure. The particle size and thickness of oxide shell can be controlled by oxidation temperature. The shell thickness of cobalt nanoparticles after the oxidation at 300°C is 4.7 nm, when compared to those oxidized at 250°C with the shell thickness of 2.4 nm due to the change in the oxidation temperature. The magnetic properties of cobalt particles have been measured with VSM. Our results show that cobalt metal (core)/cobalt oxide (shell) has two magnetic behaviors of ferromagnetic and antiferromagnetic properties in magnetic fluid.

***Index Terms*—Cobalt nanoparticles, core-shell structure, magnetic fluid, oxidation process.**