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The Effect of Surface Modifications on the Magnetic Properties of $Ni_{0.5}Zn_{0.5}Fe_2O_4$ Nanoparticles

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Two different silica sources have been used for the preparation of $Ni_{0.5}Zn_{0.5}Fe_2O_4/SiO_2$ nanocomposites, and their effect on the particle size, crystallinity, and the magnetic properties have been investigated by X-ray diffraction, transmission electron microscopy and physical property measurement system. In both cases, $Ni_{0.5}Zn_{0.5}Fe_2O_4$ nanoparticles of 11 nm in mean particle size were well dispersed in silica matrix. The coercivity and the blocking temperature of $Ni_{0.5}Zn_{0.5}Fe_2O_4$ nanoparticles modified with the silicon coupling agent show little decrease, whereas the saturation magnetization increases obviously with respect to nanoparticles dispersed directly in silica matrix. It is considered that the decrease of the surface anisotropy resulted from the change in the surface coordination is responsible for the observed behavior.

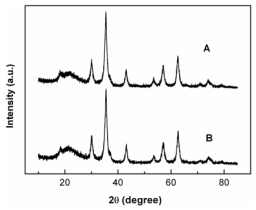

Fig. 1

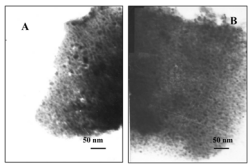

Fig. 2

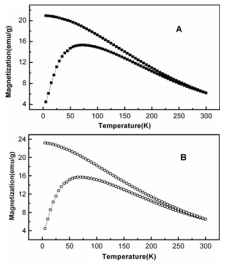

Fig. 3

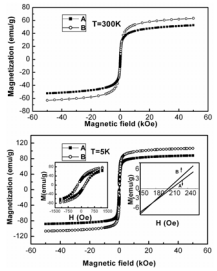

Fig. 4

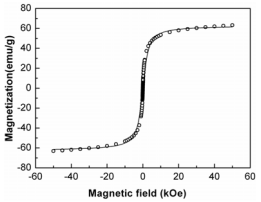

Fig. 5

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