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Synthesis and Magnetic Properties of Shuriken-like Nickel Nanoparticles

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Shuriken-like nickel nanoparticles were successfully synthesized by a thermal decomposition method at 200 ºC with Nickel(Ⅱ) acetylacetonate ($Ni(acac)_2$) as the precursor and oleylamine (OAm) as the solvent and reductant, respectively. The phase structures, morphologies and sizes, and magnetic properties of the as-synthesized nickel products were characterized in detail by using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission-scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), high-resolution transmission electron microscopy (HRTEM) and vibrating sample magnetometer (VSM). Some key reaction parameters, such as the reaction time, reaction temperature and surfactants, have important influence on the morphology of the final products. XRD pattern indicated that the products are well-crystallized face-centered cubic (*fcc*) nickel phase. SEM images demonstrated that the nickel nanoparticles are shuriken-like morphology with average size around 150 nm. The mechanism of shuriken-like Ni nanoparticles (NPs) is proposed. The magnetic hysteresis loops of shuriken-like and spherical nickel products illustrated the ferromagnetic nature at 300 K, indicating its potential applications in magnetic storage.