High coercivity sized controlled cobalt–gold core–shell nano-crystals prepared by reverse microemulsion

ABSTRACT

Size-controlled cobaltï gold coreï shell nanoparticles were synthesized via the reverse-micelle microemulsion method. In order to control the size of the nanoparticles, the nucleation and growth process were performed within a confined space by adjusting the water to surfactant ratio of reverse micelles solution during synthesis. The crystallinity percentage and percentage of phases presented in Coï Au coreï shell nanoparticles were calculated using X-ray diffraction data. The results from transmission electron microscopy provide direct evidence for coreï shell structure nanomaterials. Magnetic properties of the samples were investigated using a vibrating sample magnetometer. The as-prepared samples showed significant coercivity at room temperature. The intrinsic blocking temperature was experimentally deduced from zero-field-cooled warmed (ZFC-W) curves by a simple method without employing an external magnetic field. The B-field dependence temperature data of Coï Au nanoparticles exhibited an intrinsic blocking temperature at 45 K. Annealing these samples at 400 °C caused an increase in particle size, crystallinity percentage and further enhanced their magnetic properties.

Keyword: A. Magnetic materials; A. Nanostructures; B. Chemical synthesis; B. Magnetic properties; C. X-ray diffraction