Facile Synthesis of high moment α-Fe/oxideand FeCo/oxide core/shell nanoparticles using modified polyol route

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α-Fe/oxide and FeCo/oxide core/shellnanoparticles were synthesized by surfactantlesspolyol method followed by hydrogen reduction process.Iron oxide (Fe_3O_4) and ($CoFe_2O_4$) nanoparticles were first synthesized through modified Polyol process, followed by thermal annealing in presence of hydrogen (H_2) gas for 2 hours for reduction into Fe and FeConanoparticles. Polyethylene glycol (PEG) has played a key roleas solvent and reducing agent simultaneously in this synthesis process. X-ray diffraction (XRD)confirmed that the nanoparticles were Fe_3O_4 and$CoFe_2O_4$ before reduction processand composed ofFe_3O_4,$CoFe_2O_4$ andα-Fe, FeCo phases after reduction process.The structural and magnetic characterizations of the synthesized nanoparticles after oxidation by transmission electron microscope and vibration sample magnetometer measurements confirm the formation of core-shell Fe/oxideand FeCo/Oxide nanospheres. In view of the obtained high magnetic core Fe, FeCo and biocompatible oxide shell, these core-shell Fe/oxide and FeCo/oxide nanoparticles are expected to be promising materials for different bio-sensing applications.

Keywords: α-Fe/oxide,FeCo/oxide nanoparticles, Core/Shell nanostructures, polyol method, magnetic properties**,** immobilization.