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Enhancement of surface spin disorder in hollow $NiFe_2O_4$ nanoparticles G. HASSNAIN JAFFARI, Department of Physics and Astronomy, University of Delaware, Newark DE 19716, ABDULLAH CEYLAN, Physics Engineering Department, Hacettepe University, Beytepe, Ankara 06800, Turkey, CHAOYING NI, Department of Materials Science and Engineering, University of Delaware, Newark DE 19716, S. ISMAT SHAH, Department of Material Science and Engineering; Department of Physics and Astronomy, Univeristy of Delaware, Newark, DE 19716, USA, — We present synthesis and magnetic properties of hollow $NiFe_2O_4$ nanoparticles from core ($Ni_{33}Fe_{67}$)/shell ($NiFe_2O_4$) structure based on Kirkendall effect. Morphology of the particles can be varied from hollow to solid $NiFe_2O_4$ nanoparticles by varying the reaction temperature and time of initial core/shell structure. Particles with hollow morphology are expected to show larger surface spin disordered or spin glass phase due to the presence of additional inner surface in addition to the usual outer surface in nanoparticles. Field cooled hysteresis loops exhibit significantly large shift due to unidirectional anisotropy resulting from the additional inner along with outer surface spin glass interface in particles with hollow morphology compared to particles with non-hollow (or solid) morphology that have only outer spin glass shell coupled with ferromagnetic core. The enhancement in the surface anisotropy is also noticeable which leads to an increase in the blocking temperature of the particles with hollow morphology.

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