Abstract Submitted
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High coercive cobalt ferrite $\mathbf{Co}_x Fe_(3-x)\mathbf{O}_4$ nano-composite thin films prepared by spin-on process[1] P. TALAGALA, R. NAIK, Wayne State University, G. M. TSOI, L. E. WENGER, University of Alabama at Birmingham, R. SURYANARAYANAN, Universite of Paris - Sud, V. M. NAIK, University of Michigan - Dearborn — Spin coating technique have been employed to synthesize $Co_xFe_{3-x}O_4$ ($0.5 \leq x \leq 1.9$) nano-composite thin films of ∼10 nm crystalline size on sapphire, glass, and aluminum substrates. The films were annealed in various environments such as air, H_2/Ar, and vacuum. The structural properties were characterized by XRD and Raman Spectroscopy. The magnetic hysteresis measurements of the films exhibit a large coercivity H_C(15 - 17 kOe) at 5 K. Low temperature processed films demonstrate supermagnetic characteristics with H_C = ∼150 Oe and reduced remanence M_r/M_s =∼ 0.05 at 300K. These films show a spin-glass behavior with the blocking temperature $T_B \propto H^2$for low fields and $T_B \propto H^{2/3}$ for high fields. High temperature processed films with various annealing conditions demonstrate H_C as high as 1.8 kOe at 300K. Estimated magnetic anisotropy value of the films is in the range of 0.8 – 2.4 x 10^6 erg/cm^3. Optical absorption spectra exhibit band gaps in the visible range of 1.4 -1.7 eV and in the IR range (1.0 eV and 0.7 eV). Annealing in hydrogen shows a reduction of resistivity. Further details of the structural, electrical and magnetic properties of the films will be presented.

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