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Magnetic properties of core-shell $CoFe_2O_4$@CoFe-FeO nanoparticles at a high H/T regime[1] F.L.A. MACHADO, Departamento de Física, UFPE, 50670-901, Recife-PE, Brazil, J.M. SOARES, O.L.A. CONCEIÇÃO, Departamento de Física, UERN, 59610-010 Mossoró-RN, Brazil, E.S. CHOI, L. BALICAS, National High Magnetic Field Laboratory, FSU, Tallahassee, Florida 32306, USA — The magnetic properties of nanopowders of $CoFe_2O_4$ and of core-shell $CoFe_2O_4$@CoFe-FeO with 6 nm average particle sizes were investigated in the temperature (T) range 5 - 300 K under applied magnetic fields H up to 350 kOe. The coercive fields H_C determined from hysteresis loops were found to be highly enhanced compared to samples with larger particles sizes. For instance, for the $CoFe_2O_4$ nanoparticles H_C was found to be about 22 kOe for $T = 5$ K. The broad range of applied fields allowed us to establish of the regime of validity for the law of approach (LA) to saturation which, in turn, allowed the determination of the T-dependence for the saturation magnetization M_S and for the uniaxial anisotropy constant K_1. The core-shell exchange-coupling was found to nearly double the values of M_S (= 400 emu/cm^3) when compared to the value for the pure $CoFe_2O_4$ particles (= 240 emu/cm^3). Moreover, the T-dependence of K_1 for the core-shell particles presented a maximum close to 100 K with substantially enhanced values. The results will be discussed in terms of a particle model which takes into account a thin amorphous layer and the core-shell structure. Work supported by CNPq and FACEPE.

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