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Superparamagnetic resonance in antiferromagnetic nanoparticles: systematic features in the temperature dependence[1] PRASANTA DUTTA, MOHINDAR SEEHRA, West Virginia University — Antiferromagnetic (AF) nanoparticles (NP) of dimensions ≈ 5 nm usually acquire significant magnetic moment even below T_N due to uncompensated surface spins. This moment follows superparamagnetism (SPM) above the blocking temperature $T_B < T_N$. In this work, we will discuss some unique features in the temperature dependence of the electron magnetic resonance (EMR) spectra which have been reported in NP of ferrihydrite, NiO and γFe_2O_3 [1]. As T is lowered towards T_B the resonance field H_r decreases and the linewidth ΔH increases so that $\delta H_r \approx (\Delta H)^n$ with $n \approx 3$ is observed. This is in line with the variation expected from the demagnetizing fields of non-spherical particles [2]. From the temperature variation of the line intensity $I = (\Delta H)^2$ h (h = peak-to-peak height), the location of T_B(m) and T_B(EMR) has been obtained [1]. For $T < T_B$(m), as H_r approaches zero, the EMR line becomes highly asymmetrical, which is explained from the combined contributions of resonance at $+H_r$ and $-H_r$. [1]. Seehra et al, IEEE Trans. Magn; 37, 2207 (2001); Seehra et al, J. Appl. Phys. 97, 10J609 (2005); Dutta et al, Phys. Rev. B 70, 174428 (2004). [2]. Nagata & Ishihara, J. Magn. Magn. Mater. 104-107, 1571(1992).

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