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Magnetic and EPR Characterization of Ni(core)/NiO(shell) Nanoparticles SARITHA NELLUTLA, ALEX SMIRNOV, JUNWEI WANG, JOSEPH B. TRACY, North Carolina State University — Core/shell nanoparticles have interesting applications in various fields [1-4]. Among these systems, ferromagnet(core)/antiferromagnet(shell) are of particular importance because of their potential use as MRI contrasting agents, high density magnetic recording devices, etc. [3, 4]. Here, Ni(core)/NiO(shell) nanoparticles of different core sizes ranging from 8 nm to 22 nm have been synthesized and characterized by TEM, magnetic susceptibility and electron paramagnetic resonance (EPR) spectroscopy, as "free" (non-agglomerated) particles and agglomerated clusters. Using EPR at 9.1 GHz it is shown that the temperature dependence of the g-value and the EPR linewidth are similar for both the free particles and the agglomerated clusters. This suggests that at this magnetic field ($\sim$0.3 T) the EPR signal arises mostly from the saturated magnetic moment. EPR measurements at multiple fields/frequencies provide further insight on the microscopic magnetic structure in the free particles and the agglomeration effects. [1]. M. A. Hines, P. Guyot-Sionnest, *J. Phys. Chem.*, 100, 468 (**1996**). [2]. Z.C. Xu, Y.L. Hou, S.H. Sun, *J. Am. Chem. Soc.*, 129, 8698 (**2007**). [3]. V. Skumryev, S. Stoyanov, Y. Zhang, G. Hadjipanayis, D. Givord, J. Nogues, *Nature* 423, 850 (**2003)**. [4]. A. Hütten, D. Sudfeld, I. Ennen, G. Reiss, W. Hachmann, U. Heinzmann, K. Wojczykowski, P. Jutzi, W. Saikaly, G. Thomas *J. Biotechnology* 112, 47-63 (**2004**).

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