## Abstract Submitted for the MAR06 Meeting of The American Physical Society

<sup>1</sup>H NMR Spectra vs. the Bulk Magnetization of Magnetically Heterogeneous Systems with Nano- and Micro-scale Magnetic Inclusions E.M. LEVIN, Ames Laboratory and Department of Physics, Iowa State University (ISU), Ames, IA, A. RAWAL, Ames Laboratory and Department of Chemistry, ISU, Ames, IA, S.L. BUD'KO, Ames Laboratory and Department of Physics, ISU, Ames, IA, K. SCHMIDT-ROHR, Ames Laboratory and Department of Chemistry, ISU, Ames, IA — The bulk magnetization of magnetically heterogeneous systems, where magnetic nano- and micro-particles are dispersed in a diamagnetic matrix, is correlated with their <sup>1</sup>H static and magic angle spinning (MAS) NMR spectra. Mixtures containing magnetic  $Fe_2O_3$  nano- and micro-particles varying from 0.5 to 8 mass % in a matrix of diamagnetic laponite layered silicate were studied as model systems. Laponite has two characteristic centerbands in <sup>1</sup>H NMR, which allow us to exclude contributions that can arise from protons possibly associated with the iron oxide particles. An increase in the concentration of magnetic particles results in an increase of the width of static <sup>1</sup>H NMR spectra. In contrast, all <sup>1</sup>H MAS spectra show a very narrow centerband and a clear sideband pattern, which is due to magnetic dipole-dipole interactions and depends on the concentration of the  $Fe_2O_3$  particles. Unexpectedly, <sup>1</sup>H MAS NMR spectra are observed even if the materials have a very large magnetization of 4.8 emu/g. The width of the NMR signal increases linearly with the total bulk magnetization, which can be explained by a scaling model.

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