Abstract Submitted for the NWS08 Meeting of The American Physical Society

Site Determination of Zn and Mn Doping into Protein Encapsulated Fe_3O_4 Nanoparticles¹ V. POOL, Dept. of Physics; Montana State University, M. KLEM, Dept. of Chem. and Biochem.; Montana State University, J. HOLROYD, Dept. of Physics; Montana State University, T. HARRIS, R. SZI-LAGYI, T. DOUGLAS, Dept. of Chem. and Biochem.; Montana State University, M. YOUNG, Dept. of Plant Sciences and Pathology, Y.U. IDZERDA, Dept. of Physics; Montana State University, CENTER FOR BIO-INSPIRED NANOMATE-RIALS; MONTANA STATE UNIVERSITY TEAM — In this study, particles grown inside ferritin protein cages with 10%, 15%, 20% and 33% zinc or manganese doped into Fe_3O_4 were measured by XAS and XMCD. These spectra were compared to standards and molecular-orbital calculations to determine where in the Fe_3O_4 spinel structure the dopant is substituting. Doping into the various Fe-sites of the Fe_3O_4 spinel structure suggests that there will be a significantly different magnetic moment per iron lattice position depending on whether the A-site or B-site is favored. For Zn-doping, our results support Zn in the +2 valance state and preferentially substituting in the B-site octahedral site. For Mn-doping, we find Mn also prefers the B-site octahedral site, but may cause a structural transition to the γ -phase Fe₂O₃.

¹This work supported by the Office of Naval Research under grant 400014-06-1-1016 and the National Science Foundation.

Y.U. Idzerda Dept. of Physics; Montana State University

Date submitted: 16 Apr 2008

Electronic form version 1.4