Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Template-mediated self-assembly of ordered magnetic nanoarrays
YUCHENG SUI, WEI LIU, JIAN ZHOU, LANPING YUE, RALPH SKOMSKI, DAVID SELLMYER, Department of Physics and Center for Materials Research and Analysis, University of Nebraska, Lincoln, NE 68588 — Creation of magnetic nanostrctures is a very important research topic in nanoscience and nanotechnology. Among the popular bottom-up methods, self-assembly of magnetic nanostructures by chemical synthesis is favorable over others because it represents a low-cost and highly effective approach [1]. In this study, a novel technique template-mediated self-assembly is employed, that is the manipulation of magnetic clusters through both an external magnetic field and an ordered alumina template in order to fabricate ordered magnetic patterns with anisotropic properties [2]. This experiment consists of three parts. First, the synthesis and selection of FePt $L1_0$ clusters by hydrogen reduction and their capping by surfactants. Second, the fabrication of ordered alumina template by two-step anodization. Third, the insertion and assembly of clusters in nanopores under external magnetic field. Ordered magnetic dots were created with a coercivity of 13.4 kOe. The interactions between the scanning magnetic tips of MFM and the dots array were studied. This research is supported by DOE, NSF-MRSEC, W.M. Keck Foundation, ARO, and CMRA. 1. Y.C. Sui, R. Skomski, K. D. Sorge, and D. J. Sellmyer. Appl. Phys. Lett. 84, 1525 (2004). 2. Y.C. Sui, W. Liu, L. Yue, X.Z. Li, J. Zhou, R. Skomski and D. J. Sellmyer, J. Appl. Phys. (in press).

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Date submitted: 30 Nov 2004 Electronic form version 1.4