Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

First order reversal curve study of the dipolar interaction in Ni three-dimensional antidot arrays[1] BINGQING LI, XUZHAO CHAI, Bryn Mawr College, SINA MOEENDARBARI, YAOWU HAO, University of Texas at Arlington, DUSTIN A. GILBERT, KAI LIU, University of California, Davis, DI ZHANG, GANG FENG, Villanova University, PING HAN, Nanjing University, X. M. CHENG, Bryn Mawr College — Three-dimensional antidot arrays (3DAAs) have attracted considerable attention due to potential applications in sensors, energy storage and transducers. Magnetic 3DAAs also provide an ideal system for studying the effect of dimensionality and morphology on magnetic properties. We report study of dipolar interactions in Ni 3DAAs using the first-order reversal curve (FORC) method. Ordered Ni 3DAAs were fabricated by electrochemical deposition into colloidal crystal templates of self-assembled polystyrene spheres. The samples have the same pore size of about 500 nm but different thicknesses, ranging from 0.3 μm to 1.2 μm, confirmed by scanning electron microscopy (SEM) and atomic force microscopy (AFM). FORCs of the samples with thicknesses of 0.3 μm, 0.8 μm, and 1.2 μm were measured by a vibrating sample magnetometer. The FORC diagram analysis reveals a demagnetizing magnetic dipolar interaction, and a decrease in the interaction strength with the increasing sample thickness, evidenced by a decrease in the spread of the irreversible peak in the bias distribution, as well as a decrease in the tilting of the FORC distribution from the local coercivity axis.

[1]Work at BMC and UCD is supported by NSF DMR-1207085 and DMR-1008791, respectively.

Bingqing Li
Bryn Mawr College

Date submitted: 15 Nov 2013 Electronic form version 1.4