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Magnetization reversal in arrays of nanodots RANDY DUMAS, KAI LIU, Physics Department, UC Davis, IGOR ROSHCHIN, CHANG-PENG LI, IVAN K. SCHULLER, Physics Department, UC San Diego — Macroscopic arrays of Fe nanodots have been fabricated by using a nanoporous alumina shadow mask technique.[1] Such nanomagnets have potential applications as high density patterned magnetic recording media. We have investigated the magnetization reversal in Fe nanodots with diameters of 67, 60, and 53nm, using a first order reversal curve (FORC) method.[2] With increasing size the nanodots undergo a single domain to vortex state transition. Striking differences in the FORC diagrams have been observed. The 53nm nanodots exhibit single domain behavior and the FORCs uniformly fill the interior of the hysteresis loop. The resultant FORC distribution is a narrow ridge along the local coercivity axis with zero bias. The 60 and 67nm nanodots exhibit vortex states. Their magnetization reversal, from nucleation to annihilation of the vortex, displays clear stages of reversible and irreversible behavior as manifested in the FORC distribution. Furthermore the FORC method gives a quantitative measure of the switching and annihilation field distributions. – Work supported by NSF and AFOSR. [1] Liu et al. APL **81,** 4434 (2002). [2] Katzgraber et al. PRL **89**, 257202 (2002); Davies et al. PRB **70**, (22), Dec. 1^{st} (2004).

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