

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Fabrication of GaMnAs Magnetic Semiconductor Nanodot Arrays¹ S. BENNETT, L. MENON, D. HEIMAN, Northeastern University — Ordered arrays of GaMnAs ferromagnetic semiconductor nanodots were fabricated using anodic porous alumina templates as etch masks. In this study we used nanochannel porous alumina membranes as masks for thermal evaporation coupled with reactive ion etching for the fabrication of organized hexagonal arrays of both manganese doped semiconductor and metal alloy comprised nanodots. The GaMnAs nanodots have diameters ~ 40 nm and dot periodicity of ~ 80 nm. Field-cooled and zero-field-cooled magnetization measurements demonstrate that the dots are superparamagnetic at room temperature with a blocking temperature of $T=30$ K, below which they are ferromagnetic. This illustrates that arrays of uniform and highly-ordered nanodots can be fabricated inexpensively, rapidly and over large length scales for semiconductors which cannot be formed by techniques of self-assembly.

¹This work was supported by NSF Grants DMR-0305360 and ECCS-0551468.

Don Heiman
Northeastern University

Date submitted: 27 Nov 2007

Electronic form version 1.4