Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Fabrication and magnetism of sub-100 nm exchange-biased magnetic dot arrays and porous networks.[1] CHANG-PENG LI, IGOR V. ROSHCHIN, ZHI-PAN LI, IVAN K. SCHULLER, Physics Dept., UCSD, La Jolla, CA, USA — Studies of exchange bias (EB) at nanoscale, when the structure size is comparable to magnetic domain sizes, can offer new insights for the mechanism of EB. For these studies, sub-100 nm ferromagnetic (Ni)-antiferromagnetic (FeF_2) dots and porous network bilayers are fabricated using self-assembled porous alumina masks. The size and periodicity of the nanopatterns are controlled by anodization conditions and pore widening time. Magnetization of the field cooled dots and networks is measured at 10 K by SQUID magnetometry and magneto-optical Kerr effect (MOKE), respectively. For the dots, the EB field is found to decrease as the dot diameter decreases. For example, with Ni/FeF_2 dot diameter decreasing from 98 nm to 52 nm, the EB field decreases from 640 Oe to 240 Oe. For networks with the constant pore periodicity, an increase in pore diameter from 50 nm to 70 nm results in a decrease of EB field from 150 Oe to 90 Oe. The results suggest that the EB decreases as the magnetic structure size decreases, regardless of its actual shape.

[1]Work is supported by AFOSR.

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Date submitted: 12 Jan 2006 Electronic form version 1.4