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Spin-dependent Transport in GaAs/MnAs Core/shell Nanowires JING LIANG, JIAN WANG, A. PAUL, B.J. COOLEY, D.W. RENCH, N.S. DELLAS, S.E. MOHNEY, R. ENGEL-HERBERT, N. SAMARTH, Center for Nanoscale Science and Materials Research Institute, Penn State University, University Park PA 16802 — Hybrid GaAs/MnAs core/shell nanowires synthesized by molecular beam epitaxy [APL **97**, 072505 (2010)] are of potential interest for proof-of-concept room temperature nanospintronics applications. Magnetic order in these nanostructures is directly influenced by a unique competition between the magnetocrystalline and shape anisotropies in MnAs. We report four probe measurements of the temperature dependence of the resistivity and the anisotropic magnetoresistance (AMR) in single nanowires over a temperature range 1 K - 300 K and in magnetic fields ranging up to 80 kOe, applied both parallel and perpendicular to the nanowire axis. We used the measured AMR in conjunction with micromagnetic simulations to reveal the detailed magnetization reversal process in the MnAs nanoshell. The micromagnetic simulations also provide insights into interesting structures for spin engineering at the nanoscale. Supported by NSF-MRSEC and ONR.

Nitin Samarth
nsamarth@psu.edu
Penn State University, University Park PA 16802

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