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Using Single Nanoparticle Devices to Investigate Nano-junction GMR and TMR J.J. KAVICH, R.H. KODAMA, University of Illinois at Chicago, Chicago, IL 60607, J.W. FREELAND, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439 — High-pressure sputtering / cluster-beam deposited single nanoparticle devices were fabricated to study giant magneto- resistance (GMR) and tunneling magneto-resistance (TMR) of nano- junctions. The junction used to investigate GMR was formed by the point contact of a nearly spherical ∼20 nm diameter ferromagnetic (FM) particle on a FM thin film deposited on a silicon substrate. The particles were covered with a thick Al_2O_3 dielectric layer. The tunneling device is identical, except for an additional Al_2O_3 tunnel barrier sandwiched between the FM particle and film. Using a focused ion beam (FIB), small apertures were milled in the dielectric layer to expose individual particles and metallic contacts were subsequently deposited. Other contacts were made directly to the underlying FM film creating a simple two- contact measurement geometry. Temperature dependent TMR and GMR are presented for isolated particles that are independent of proximity and ensemble effects. This work is supported by the ACS Petroleum Research Fund.

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