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Magnetic interactions among Co nanowires HAFSA KHURSHID, MICHAEL BONDER, GEAROGE HADJIPANAYIS, University of DE — Magnetic nanowires have recently gained much attention because of their potential applications in magnetic recording, sensors and other electronic devices. The magnetic properties of nanowires are determined by the competition between magnetocrystalline and shape anisotropy resulting from the reduced dimensionality of the system. In this study we present results on the magnetic interactions among arrays of electrodeposited Co nanowires as a function of inter-wire spacing and nanowire diameter. X-Ray diffraction and electron microscopy reveal that the nanowires exhibit the hexagonal closed packed polycrystalline structure. The direction of the magnetic easy axis is controllable as a function of wire diameter. By increasing the diameter of nanowires from 30 to 188 nm, the magnetic easy axis switches from perpendicular to parallel to the nanowire's major axis. This is further evidenced by a decrease in coercivity from 1200 to 100 Oe and a reduced loop squarness. The magnetic interactions were probed using delta M plots. All samples exhibit a negative delta M curve indicative of magnetostatic interactions. As the inter-wire spacing increases there is a broadening of the dipolar component of delta M plots indicating an increase in the switching field distribution. This work was supported by NSF Grant# DMR-0302544.

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