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Magnetic properties of electrodeposited $Co_{0.45}Fe_{0.55}$ nanowire arrays PETRU FODOR, Cleveland State University, GEORGI TSOI, Wayne State University, LOWELL WENGER, University of Alabama at Birmingham — The structural and magnetic properties of an array of micron-long $Co_{0.45}Fe_{0.55}$ alloy nanowires with diameters ranging from 12 to 52 nm electrodeposited in porous anodic alumina templates have been studied using X-ray diffractometry, scanning electron microscopy, and magnetization measurements. The nanowires are found to crystallize in a body-centered-cubic (bcc) structure along the (110) axis for all diameters studied. The magnetization curves indicate a highly anisotropic behavior with the easy axis along the nanowire axis and a coercivity of 3500 Oe at room temperature. Results from the magnetization hysteresis and magnetic relaxation measurements suggest that the magnetization reversal takes place through localized nucleation in volumes smaller than the physical volume of the nanowires. The localization of the nucleation combined with the cooperative effects arising from magnetostatic interactions between the nanowires, limits the coercivity of the nanowire arrays.

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