Magnetic properties of arrays of nanowires on alumina membranes.

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Arrays of magnetic nanowires have attracted considerable interest, mainly motivated by their applications in high density magnetic information storage and for magnetic sensors. The macroscopic magnetic behavior of such systems is strongly dependent on the effective magnetic anisotropy (mainly determined by shape) and dipole-dipole interaction among magnetic wires. In the case of long nanowires, it is expected that the preferred magnetization direction of the array is dominated by the strong nanowire shape anisotropy, and consequently the easy axis is expected to lay along the nanowire axis. However, the remanence and coercivity of the samples can be changed by the electrochemical potential applied during the growing process or by the final length of the wires in the array. The magnetic properties of arrays of magnetic nanowires, prepared by electrodeposition in nanopores of alumina membranes, were investigated. A simple model based on the Stoner-Wohlfarth theory is used to explain the angular dependence of the remanence and coercivity of the nanowires. We have also measured first order reversal curves (FORC) of these systems and the corresponding diagrams provide detailed information about the distributions of interactions an coercivities present.