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Magnetic properties and magnetization reversal in Co/Au multilayers (abstract)

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Magnetic properties and magnetization reversal in Co/Au multilayers (abstract)

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We report studies of magnetic properties in CoX Å/Au60 Å multilayers (X=5,6,7,8,12,20 Å), which were prepared by sputtering on Si(111) substrates, with emphasis on the magnetization reversal. Magnetization reversal was investigated by measurements of initial magnetization curves, minor loops, coercivity as a function of the maximum field of minor loops, temperature dependence of magnetic properties using Kronmüller's model,[1] time decay of Kerr rotation angle Θ_K, and the field-sweep speed dependence of coercivity $H_c(dH_a/dt)$ at room and/or low temperature. It is found that (1) the thermal activation volumes determined by $H_c(dH_a/dt)$ increase from $\sim 2.0\times10^{-17}$ to $\sim 9.9\times10^{-17}$ cm^3 as X varies from 5 to 20 Å, which corresponds to a cylindrical activation volume with ~800 Å diameter. (2) A Kronmüller analysis together with the initial magnetization curves, etc., for a Co5 Å/Au60 Å sample at room and low temperature indicates that wall pinning with small pinning sites is the major coercivity mechanism. The interaction between grains was studied with the so-called ΔM method: samples with thin Co layers (X=5,6,7 Å), which show perpendicular anistropy, exhibit negative ΔM or dipolar interactions, while samples with a thick Co layer (e.g., X=20 Å), which show in-plane anisotropy, exhibit positive ΔM or ferromagnetic exchange interactions. [S0021-8979(96)60208-9]

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[1]H. Kronmüller, K. D. Durst, and M. Sagawa, J. Magn. Mater. **74**, 291 (1988).

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