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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 $\text{Co}X \text{ \AA}/\text{Au}60 \text{ \AA}$ multilayers ($X=5,6,7,8,12,20 \text{ \AA}$), 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 $\sim 2.0 \times 10^{-17}$ to $\sim 9.9 \times 10^{-17} \text{ cm}^3$ as X varies from 5 to 20 \AA , which corresponds to a cylindrical activation volume with $\sim 800 \text{ \AA}$ diameter. (2) A Kronmüller analysis together with the initial magnetization curves, etc., for a $\text{Co}5 \text{ \AA}/\text{Au}60 \text{ \AA}$ 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 ($X=5,6,7 \text{ \AA}$), which show perpendicular anisotropy, exhibit negative ΔM or dipolar interactions, while samples with a thick Co layer (e.g., $X=20 \text{ \AA}$), which show in-plane anisotropy, exhibit positive ΔM or ferromagnetic exchange interactions. © 1996 American Institute of Physics. [S0021-8979(96)60208-9]

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