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 Co\textit{X} Å/Au60 Å multilayers (\textit{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,\textsuperscript{1} time decay of Kerr rotation angle $\Theta_K$, and the field-sweep speed dependence of coercivity $H_c(dH/dt)$ at room and/or low temperature. It is found that (1) the thermal activation volumes determined by $H_c(dH/dt)$ increase from $\approx 2.0 \times 10^{-17}$ to $\approx 9.9 \times 10^{-17}$ cm$^3$ as \textit{X} varies from 5 to 20 Å, which corresponds to a cylindrical activation volume with $\approx 800$ 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 $\Delta M$ method: samples with thin Co layers (\textit{X}=5,6,7 Å), which show perpendicular anisotropy, exhibit negative $\Delta M$ or dipolar interactions, while samples with a thick Co layer (e.g., \textit{X}=20 Å), which show in-plane anisotropy, exhibit positive $\Delta M$ or ferromagnetic exchange interactions. © 1996 American Institute of Physics. [S0021-8979(96)60208-9]