9.7 cm

ANNEALING EFFECTS ON CO/CU MULTILAYERS WITH ALTERNATING CO SUBLAYER THICKNESS

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The magnetic and magnetoresistive properties of sputter-deposited glass/[Co(t_{Co1})/Cu(t_{Cu})/Co(t_{Co2})/Cu(t_{Cu})]$_{15}$ multilayers with alternating thicknesses of Co sublayers are investigated (t_{Cu}=2 to 6 nm, t_{Co1}=1.5 nm and t_{Co2}=0.2 to 1 nm). We observe substantial differences in R(H) characteristics depending on t_{Co2} value. For small t_{Co2} magnetoresistance has granular-like character which is due, as magnetization measurements indicate, to the presence of small, superparamagnetic Co grains. It is shown that annealing at temperatures up to 573 K enhances a magnetoresistance ratio but does not reduce a hysterecity of a R(H) dependence and gives no improvement in a sensitivity of the GMR effect. This changes are likely caused by a smoothening of Co/Cu interfaces. At higher annealing temperatures GMR decreases. It is shown too that multilayers with thinner Co sublayers ($t_{Co2}\approx$0.2 nm) are relatively more stable at higher annealing temperatures. Thermally driven pinholes creation, which decreases the GMR by creating areas with ferromagnetic interlayer coupling, is counterbalanced in that case by the growth of grain sizes within the thinner Co layers. This growth increases magnetic order and stabilizes magnetoresistance.

13.4 cm

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