INFLUENCE OF Al THICKNESS ON MAGNETISATION PROCESS OF $Co/Al\text{-}O/(Ni_{80}Fe_{20})$ TRILAYERS

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9.7 cm

We have investigated the magnetisation reversal processes of $Co/Al\text{-}O/(Ni_{80}Fe_{20})$ heterostructures as a function of Al thickness (d_{Al}). The $Co(25nm)/Al(d_{Al})\text{-}O/(Ni_{80}Fe_{20})$ (25nm) trilayers with 0.5 nm$\leq d_{Al} \leq$ 5 nm were deposited onto SiO_x wafers by evaporation in UHV system. The Al spacer layers were naturaly oxidised in air before deposition of the top ($Ni_{80}Fe_{20}$) layer. The magnetic hysteresis loops were measured in-situ during deposition process as a function of thickness as well as a function of time during oxidation process. Our magnetisation measurements revealed the existence of the critical Al thickness $d_{cAl} \approx 1.2nm$. For $d_{Al} < d_{cAl}$ a direct ferromagnetic coupling between Co and $Ni_{80}Fe_{20}$ was observed, however for $d_{Al} > d_{cAl}$ well separated magnetisation loops were found. The in-situ conductance measurements allowed us to evaluate a thickness of aluminium oxide d_{Al-O} formed during oxidation process. It has been found that after 24 hours of oxidation $d_{Al-O} \cong$ 0.5 nm independently on d_{Al}. For selected samples the ex-situ atomic force microscopy measurements have been performed after each step of deposition process in order to check the surface (interface) roughness of the already deposited materials.

13.4 cm

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