

Fabrication and characterization of hybrid tunnel magnetoresistance structures with embedded self-assembled nanoparticle templates

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We report on an incorporation of self-assembled templates of superparamagnetic Fe-O nanoparticles into tunnel magnetoresistance (TMR) devices. We fabricated a multi-layer stack composed of the following layer sequence: Cr/Au/Co/NP/Co/Cu on Si(100) substrate where NP stands for a self-assembled layer of nanoparticles deposited by Langmuir-Blodgett technique. The X-ray reflectivity (XRR) and grazing-incidence small angle X-ray scattering (GISAXS) were employed to study the layers thicknesses and interface morphology in each preparation step. In particular, the XRR and GISAXS were measured before and after the nanoparticle incorporation as well as on the complete TMR stack. In this way, in-depth morphology profile during subsequent preparation steps was obtained. We demonstrate that X-ray analysis of the deposited TMR stack is essential for successful fabrication of novel hybrid devices consisting of self-assembled nanoparticles.

9.7 cm

13.4 cm

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