

Changes of the MBE-grown Ni-Fe/Au/Co/Au multilayers magnetotransport properties induced by the deposition temperature

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The vast majority of already collected information about Ni-Fe/Au/Co/Au multilayers comes from the experiments performed on the systems obtained with the magnetron sputtering at room temperature. Hence, the information about such structures (with perpendicular anisotropy of Co and in-plane anisotropy of Ni-Fe) is limited to specific deposition conditions and specific sublayers thicknesses. Therefore, it is relevant to take the additional factors, such as possible discontinuities of ferromagnetic and nonmagnetic sublayers, intermixing and interface roughness, into account. It may be achieved for example by the change of the deposition method or by the substrate temperature variation. In the following, the influence of the substrate temperature (T_D) on the microstructure, electrical and magnetic properties of MBE-grown Ni-Fe/Au/Co/Au multilayers is presented. Reflection High Energy Electron Diffraction (RHEED) revealed a change in the multilayer growth mode from the 3D to locally 2D one while depositing the second repetition. Those microstructure changes were correlated with the Ni-Fe/Au and Co/Au interface alterations and giant magnetoresistance amplitude changes. Moreover, the in-situ conductance measurements denoted Co sublayers to be discontinuous within multilayers deposited at $T_D > 25^\circ\text{C}$, and that the formation of Co grains smoothens the Au surface without continuous layer formation (for $T_D > 100^\circ\text{C}$) or intermixing.

9.7 cm

13.4 cm

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