Surface potential influence on the growth of Co_2FeSi Heusler alloys thin films on graphene

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All-spin logic devices are based on the lateral spin valve (LSV) structure, which consists of two (or more) laterally separated ferromagnetic electrodes bridged by a nonmagnetic channel. The basic operation is switching of the bistable nanomagnets between their stable states representing binary data if enough torque is exerted on them [1]. The main building blocks of LSV devices are: spin injectors/detectors (ferromagnetic electrodes) and a spin transport channel. The suitable spin transport channel should allow for long spin lifetime and long distance spin propagation. The experimental studies of spin transport measurements identified graphene as the most favourable material for spin transport channel in spin-logic devices [2]. The key feature of the spin injectors/detectors is their electrons spins polarization at the Fermi energy. Hence, the ideal candidates for spin injection/detection are half-metallic ferromagnets which exhibit 100% spin polarization of conduction electrons. Examples of these are some Heusler alloys: NiMnSb, Co_2FeSi, Co_2MnSi, among others [3]. However, the growth of the Heusler alloys on the graphene was not studied before. Graphene properties depend strongly on the underlying material, number of layers, etc. Furthermore, the surface state affects adsorption, surface migration and aggregation of deposited atoms. Herein, we present the influence of the surface potential of the graphene substrate on growth properties of Co_2FeSi Heusler alloys thin films deposited by molecular beam epitaxy.

References:

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