

Au/Co/Au heterostructures studied by ^{59}Co NMR technique

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Thin films of hexagonal Co with perpendicular magnetic anisotropy are interesting for spintronic applications, since they can be used as a source of highly polarized spin current. In this work we report the results of Co NMR studies on Au(111)/Co/Au heterostructures where Co layer thickness d is varied from 15Å to 100Å. The aim of this study was to examine structural changes of the Co layer as a function of thickness and to investigate interface effects due to strain induced by the lattice mismatch, which may influence the magnetic anisotropy. It was found that Co layers with $d < 30\text{Å}$ make atomically sharp interface to Au(111) substrate in major part of the contact area. Co atoms located inside a bulk of the layer reveal a higher resonance frequency than that reported for a bulk sample with magnetization in the hexagonal plane. It reveals strained Co layer with hexagonal lattice strongly clamped to the lattice of the Au(111) substrate. For thicker layers with $d \geq 30\text{Å}$ a structural transition to a relaxed hexagonal structure with an increased amount of grain boundaries takes place in the entire volume of the Co film. The strain at the interface to Au substrate is released by incorporation of Au atoms into the first atomic plane of Co film.