(S-06)

Magnetoresistance of layered structures with alternating in-plane and perpendicular anisotropies

J. B. Kim, Y. J. Yoo, Y. P. Lee, F. Stobiecki*, and B. Szymański*
q-Psi & Department of Physics, Hanyang University, Seoul, Korea,
*Institute of Molecular Physics, Poznań, Poland

Since the discovery of giant-magnetoresistance (GMR) effect, various layered structures have been designed and investigated. Unlike granular films, the resistance change with magnetic field $R(H)$ is accompanied by a reorientation, from antiparallel to parallel of the magnetization configuration in ferromagnetic layers, in the layered film structures. In this study, the magnetization reversal and the magnetoresistance in a layered structure, consisting of permalloy (Py = $Ni_{83}Fe_{17}$) and Co layers separated by Au spacers, were investigated.

(Py/Au/Co/Au) multilayered films with different thicknesses of Au ($0.5 \leq t_{Au} \leq 3$ nm), Py ($1 \leq t_{Py} \leq 4$ nm) and Co ($0.2 \leq t_{Co} \leq 1.5$ nm) layers were fabricated by ultra high-vacuum magnetron sputtering. While the films with $t_{Au} \geq 1.5$ nm exhibit a weak coupling between the Py layers with an in-plane anisotropy, those with $0.3 \leq t_{Co} \leq 1.2$ nm show a perpendicular anisotropy. The magnetic domain structures were elucidated by magnetic force microscopy. It was found that the domain structures change from labyrinth to stripe as the Au sublayer thickness varies. These result are further analyzed in connection with the magnetic anisotropy and the MR properties of films.