Nonlinear magneto-optical response of Co/Cu multilayered nanowires (abstract)

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Wire-shaped magnetic multilayers are known to exhibit a giant magnetoresistive effect.¹ On the other hand, producing the regularly structured submicron objects is one of the challenges of nanotechnology. A detailed characterization of such objects has become a problem of primary importance, in particular their interfaced properties, which strongly influence the magnetoresistive behavior. In this paper, we test the magnetization sensitive second harmonic generation (MSHG) technique on Co/Cu multilayered nanowires. As a new magneto-optical technique, MSHG was recently demonstrated to have the strong combination of interface sensitivity with very large magneto-optical effects.² Therefore, it might be a suitable method for the characterization of these multilayer interfaces. The samples were prepared by alternative electrodeposition of the two metals resulting in a multilayers grown perpendicularly to the wire axis, with a layer thickness of few nm. MSHG measurements showed a large nonlinear optical response of these samples which is clearly due to their complicated structure. Magnetic response of MSHG roughly followed the usual Kerr-effect behavior, however, with some nonmonotonic effects in intermediate fields. This might be related to a nonsynchronous reversal of the Co layers. In addition, we make an attempt to correlate the observed MSHG signals with a multiple-scattering modeling of the interfaces. © 1997 American Institute of Physics. [S0021-8979(97)95808-4]

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