

Giant magnetoresistance of [NiFe/Au/Co/Au]_N multilayers deposited on flexible substrates

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In flexible magnetoelectronics¹ it is desirable that the magnetic properties of materials used, especially the shape of magnetic and magnetoresistance hysteresis loops, vary only slightly as the sample is exposed to bending. In the presented investigation, [NiFe/Au/Co/Au]₁₀ multilayers (MLs) exhibiting giant magnetoresistance are sputtered on an adhesive polypropylene tape as a flexible substrate to provide conditions relevant to examination of prospective applicability of this films to flexible electronics. Co layers, due to the Co/Au surface anisotropy, possess perpendicular magnetic anisotropy. Hysteresis loops and magnetoresistance have been measured for three different systems. One of them was the ML on flat Si(100) substrate, another one was the ML on flat polypropylene substrate (silicon covered with the tape) and finally the ML wound on a cylinder with a small radius to reveal expected high bendability of the sample. The first two systems exhibit very similar properties, despite the greater surface roughness in the case of the second one. Magnetic properties of cylindrically shaped sample was found to be quasi-isotropic when external magnetic field was applied perpendicularly to the axis of the cylinder and could therefore serve as a magnetic field sensor. Mechanical stability of MLs is also discussed.

¹B. Y. Ahn, E. B. Duoss, M. J. Motala, X. Guo, S.-I. Park, Y. Xiong, J. Yoon, R. G. Nuzzo, J. A. Rogers, and J. A. Lewis, *Science* **323**, 1590 (2009)

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13.4 cm

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