Tunneling magnetoresistance of glass/Co/Al_2O_3/$Fe_{50}Co_{50}$/$Ni_{80}Fe_{20}$ nanostructures with one magnetostrictive layer

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Abstract: Magnetic tunnel junctions of the glass/Co(10 nm/Al_2O_3(t_x)/$Co_{50}Fe_{50}$(1.8 nm)/$Ni_{80}Fe_{20}$(10 nm) configuration for t_x from 1.4 to 2.6 nm were fabricated by RF-sputtering. Samples were studied by means of the atomic force microscopy (AFM), high-resolution transmission electron microscopy (HR-TEM) and tunneling magnetoresistance (TMR) measurements. The tunneling magnetoresistance was investigated as a function of the thickness, as well as the oxygen concentration of the insulating layer. The optimum configuration was obtained for t_x = 1.8 nm. In this case, a magnetoresistance of 12 % was reached in an applied field of about 2 mT. From analyses of the I-V characteristics, the effective barrier width and height of the isolator turned out to be equal to 1.5 nm and 1.3 eV, respectively. These magnetic tunnel junctions can be used to design pressure sensors.

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