Investigation of magnetostatic interactions in NiFe/Au/Co/Au multilayers

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Magnetic multilayers (MLs) with noncollinear magnetizations of successive layers are of growing interest due to perspective applications in spintronics. Particularly interesting, promising higher storage densities, are systems displaying perpendicular magnetic anisotropy. In NiFe/Au/Co/Au MLs the magnetostatic fields of Co layers with perpendicular anisotropy lead to an unusual resistance dependence on the external magnetic field [1]. The dependence can be explained assuming that the magnetization reversal of NiFe layers, characterized by easy-plane shape anisotropy, is influenced by the stray fields originating from the stripe-like domain structure of thin Co layers. The standard techniques utilized in the investigation of magnetization hysteresis curves, like magnetometry or Kerr effect measurements, give the combined information about the magnetization of Co and NiFe layers. Without the dedicated theory, which is not available yet, any detailed investigation of the magnetization reversal calls for element specific measurements of magnetization state of the samples. I will discuss the application of Mössbauer spectroscopy in the determining the orientation of NiFe layers magnetization and compare the results with data obtained from giant magnetoresistance measurements and micromagnetic simulations [2]. After that I will present the results of element specific soft x-ray resonant magnetic scattering hysteresis measurements showing that the magnetization reversal of the NiFe layers is strongly influenced by the magnetostatic fields of Co layers [3].

References

