Magnetic Multilayers

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Abstract

Magnetic Multilayers (MM) show new and unique phenomena like exchange coupling between magnetic layers across a nonmagnetic spacer, giant magnetoresistance or perpendicular magnetic anisotropy. The reduced symmetry associated with the layered structure and the existence of multiple and coupled interfaces modify the spin-dependent electronic structure of the thin film constituents, giving rise to distinct MM characteristics.

We discuss the qualitatively new MM effects focusing on those specific to layered structures. We present calculations of the electronic properties of various magnetic-nonmagnetic multilayers and superlattices, arguing their implications for the nanostructure macroscopic dynamical coupling and transport phenomena. The magnetic properties and the magnetic anisotropy of ordered and disordered surface alloys will be also discussed. After reviewing the physics of magnetic nanostructures, we will describe some of the central problems associated to the development of a spin-dependent magnetoelectronics.