S2.4 Spin structures in thin magnetic films: recent developments towards spintronic materials

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Ultrathin films and nanostructues have received much attention in recent years owing to their scientific and technological relevance for various magneto- and spin-electronic devices. There is a large interest to explore spin and domain structures in remanence, magnetization reversal mechanisms, and interaction effects between films with different anisotropies and magnetic order. Ferromagnetic films used as electrodes on semiconductor surfaces for spin injection require high spin polarization at the interface, perpendicular anisotropy, and a single domain state. Magneto-electronic applications, such as the giant magnetic resistance (GMR), tunnelling magneto-resistance (TMR), spin valves, and magnetic random access memory devices (MRAM) require perfect interfaces between ferromagnetic and non-magnetic metals or between ferromagnetic metals and oxides. Furthermore, precise thickness control of the spacer layer between the ferromagnetic layers is of crucial importance.

In addition there is a large interest to employ thin films and artificial multilayers for fundamental studies of phase transitions in lower dimensions as well as dimensional cross-over effects. The competing interaction between different ordering mechanisms, such as ferromagnetic and antiferromagnetic ordering in Fe/Cr systems or ferromagnetic and superconducting ordering in Fe/V systems is a highly active research field.

In the first part of this presentation I will provide an overview of the different activities in the magnetic thin film area with relevance for magneto- and spintronic device applications. In the second part I will review and discuss recent results concerning the magnetic moment of Mn in diluted GaAs compounds, growth and magnetic properties of Fe and FePt alloys on GaAs [1-3], as well as Heusler alloys [4] as potential ferromagnetic electrodes in spintronic devices.

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