

Investigating Magnetic Roughness by Neutron and X-ray Scattering.

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Magnetic multilayers have been the subject of intense study for more than two decades. An important reason for this is the large number of technological applications that have derived from the ability to grow materials in layered intimate contact. The interface between two layers of material is for many physical properties of multilayers, the most important part of the structure. Consequently a great deal of effort has been expended on understanding the relationship between the interface and many of the properties of interest such as electron scattering, spin transfer or magnetisation. A great deal of expertise has evolved over the years of determining the structure of buried interfaces through the use of neutron and x-ray scattering. Recently these studies have been extended to include magnetic roughness. This term refers to features of the magnetisation that are responsible for the purely magnetic diffuse scattering observed in experiments. An obvious example is the magnetic scattering from the domain structure of a magnetic layer, but our goal is to understand the relationship between structural roughness and magnetic diffuse scattering observed even in saturating magnetic fields.

We shall describe experiments on samples that have been prepared on templates of micron-sized spheres to introduce a periodic roughness. These are designed to allow us to attempt to separate the magnetic and structural contributions to the scattering. We shall discuss these effects and their implication for interlayer coupling and exchange bias.