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# Using SANS to probe the nano-magnetic structure and magnetic reversal of perpendicular recording media

*Thursday, 15 September 2011 17:00 (30 minutes)*

Perpendicular magnetic recording media have recording layers that are compositionally segregated, with grains of a magnetic CoCrPt alloy separated by a thin oxide shell, typically SiO2. The average grain diameter is typically 8 nm and film thicknesses are normally in the range 11 –16 nm. These media have their magnetic moments oriented perpendicular to the plane of the film and have sufficient perpendicular anisotropy to maintain a written bit of information against thermally activated reversal of magnetization. Determining the local magnetic structure and reversal behaviour is key to understanding the performance of perpendicular media in recording devices, but this can be problematic at the length scales required for these systems. Small-angle neutron scattering (SANS) is a very effective approach to measure these materials at a sub-10nm length scale. However, due to the small volume of material available in these thin films the experiments can be rather challenging. The difficulty is exasperated by the multi-layered architectures of writeable recording media, which contain additional layers, some of which may also be magnetic, in order to control the properties of the data storage layer. The use of polarised neutrons (SANSPoL) can be particularly useful in separating out the component of the scattering arising from the data storage layer, which is typically less than 1% of the total scattering.
The methodology used to measure these systems will be discussed, and some recent finding will be presented where SANS and SANSPoL can reveal information not easily determined by other methods. This will included the measurement of magnetic switching and information on the grain-size dependant anisotropy distributions within these materials.

## Please specify the session

Plenary session

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Talk

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