

Recent developments at the CONRAD instrument at the Helmholtz Centre Berlin

Tuesday, April 17, 2012 5:00 PM (30 minutes)

In recent years several new techniques have enlarged the area of applications of neutron imaging; among the most important of these are Bragg-edge mapping, polarised neutron imaging and interferometric imaging. In this talk an overview will be given on recent developments in these methods at CONRAD, the neutron imaging instrument at the Helmholtz Centre Berlin. Polycrystalline materials exhibit significant wavelength-related variation in neutron transmission around the Bragg cut-off for polycrystalline materials. Polarised neutron imaging uses analysis of the spin rotation around magnetic field distributions to directly visualise magnetic phenomena [1]. Applications in this field might become one of the most important areas in future, strengthening the position of neutron imaging in science and technology. Interferometric imaging exploits interference effects to simultaneously measure attenuation, phase/refraction and (U)SANS/dark-field signals [2,3]. This opens the way to imaging nano/microscopic structures in bulk materials (e.g. fissures/voids in engineering materials) and magnetic domain structures inside macroscopic objects [4,5]. Examples for 3D imaging of magnetic domains will be given [4]. The wavelength dependence of the small angle scattering signal will be discussed. Another focus will be laid on imaging of fuel cell and other engineering materials, especially with monochromatic neutrons.

[1] Kardjilov, N. et al. *Nat. Phys.* 4, 399-403 (2008).

[2] Pfeiffer, F. et al. *Nat. Mater.* 7, 134-137 (2008).

[3] Strobl, M. et al. *Phys. Rev. Lett.* 101, 123902 (2008).

[4] Manke, I. et al. *Nature Communications* 1, 125, DOI: 10.1038 /ncomms1125 (2010)

[5] N. Kardjilov et al. *Materials Today* 14, 6, p. 248-256 (2011)

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