MM 22: Topical Session Nanoanalytics using Small-Angle Scattering - Poster

Time: Tuesday 14:45–16:30 Location: P4

MM 22.1 Tue 14:45 P4

The ratio of magnetic and nuclear small-angle neutron scattering in neutron-irradiated binary iron alloys — •Frank Bergner and Andreas Ulbricht — Forschungszentrum Dresden-Rossendorf

The effect of neutron irradiation on the formation of defect-solute clusters in binary iron alloys is important for the understanding of the damage mechanisms in structural materials applied in the fields of nuclear technology. These nanoscale features operate as scatterers. The composition of the clusters in terms of solute atoms, iron atoms and vacancies is subject to debate. The A-ratio defined as the ratio of the scattering cross sections perpendicular and parallel to a saturation magnetic field in a sample of a ferromagnetic material provides a link between measurable quantities and cluster composition.

SANS measurements performed for neutron-irradiated binary Fe-Cu, Fe-Ni and Fe-Cr alloys are reported. The analysis is based on the assumption of a two-phase matrix-inclusion topology with inclusions (clusters) fully coherent with the matrix, i.e. clusters consist of atoms of the alloying element, Fe-atoms and/or vacancies confined to lattice sites of a rigid bcc lattice. The values of the A-ratio obtained for Fe-Cu and Fe-Ni can be explained as clusters containing vacancies. The derived vacancy fractions will be specified. For the investigated Fe-9at%Cr alloy the situation is more complex and will be discussed in the paper.

MM 22.2 Tue 14:45 P4

Extending the possibilities of a Kratky-Compact-Camera by use of focussing multilayer X-ray optics — Thomas Henze, •Albrecht Petzold, Klaus Schröter, and Thomas Thurn-Albrecht — Institut für Physik, Martin-Luther-Universität Halle-Wittenberg, 06099 Halle, Germany

The use of focussing multilayer x-ray optics on laboratory x-ray equipment offers the potential of a substantial gain in primary beam intensity without a significant loss of resolution. We present the result of a refurbishment of Kratky-Compact-Camera, a classical setup for small angle x-ray scattering on isotropic samples, with an elliptically bent focussing multilayer. The advantages of the Kratky collimation system are ease of alignment, high intensity and low background. A further gain in intensity is highly desirable for time dependent experiments as well as for measurement of weakly scattering samples. The performance of the revised setup is analyzed quantitatively by comparing intensity and full width at half maximum of the primary beam, as well as the minimal accessible scattering vector with the corresponding parameters of the simple setup without optics. A gain in intensity of a factor 2 up to 10 is achieved, depending on the details of the alignment. In addition the multilayer produces a monochromatic beam. First measurements on expemplary polymer systems are shown.