



Magnetic microstructure of nanocrystalline Fe-Nb-B alloys as seen by small-angle neutron and X-ray scattering

Dienstag, 17. September 2024 17:00 (20 Minuten)

We have investigated the magnetic microstructure of two-phase Fe-Nb-B based Nanoperm alloys using unpolarized small-angle neutron scattering (SANS) and small-angle X-ray scattering (SAXS). Our SANS analysis reveals a significantly large magnetic scattering contribution due to spin misalignment, primarily originating from the substantial jump in the longitudinal magnetization at the interfaces between the particles and the matrix. The magnetic scattering exhibits an angular anisotropy that resembles a clover-leaf-type pattern, consistent with the predictions of micromagnetic SANS theory. Analysis of the one-dimensional SANS data yields values for the exchange-stiffness constant and the average anisotropy and magnetostatic fields. The micromagnetic correlation lengths for all three samples are of similar magnitude and exhibit a field variation with sizes ranging between about 10-30 nm. We also find that the nuclear and magnetic residual scattering component of the SANS cross section exhibits a similar q dependency as the SAXS data. These findings further validate the applicability of micromagnetic SANS theory, and the mesoscopic information obtained is crucial for the advancement of the soft magnetic properties of this class of material.

Autor: RAI, VENUS (University of Luxembourg)

Co-Autoren: MICHELS, Andreas (Department of Physics and Materials Science, University of Luxembourg); Dr. TITOV, Ivan (Department of Physics and Materials Science, University of Luxembourg); Prof. KOHLBRECHER, Joachim (Paul Scherrer Institute); Prof. SUZUKI, Kiyonori (Department of Materials Science and Engineering, Monash University)

Vortragende(r): RAI, VENUS (University of Luxembourg)

Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Magnetism & Superconductivity