Poster Presentation

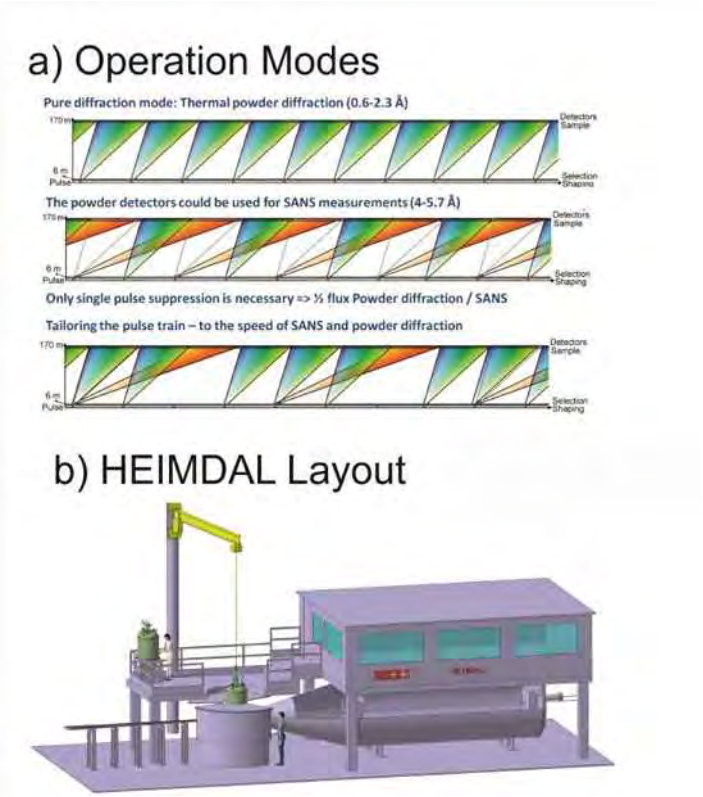
IT.P32

HEIMDAL: A novel materials science neutron powder diffractometer at ESS

S. Holm[1], M. Bertelsen[1], A. Singh[2], J. Schefer[2], K. Lefmann[1], M. Christensen[3]

[1]University of Copenhagen, Nanoscience Center, Denmark, [2]Paul Scherrer Insitut, Laboratory for Neutron Scattering, Switzerland, [3]Univeristy of Aarhus, Department of Chemistry & iNano, Denmark

Developing new materials is the most challenging task for the future demands due to limitations in energy, resources but also environmental damage. Improvements in material performances are reached for example by the incorporation of advanced ceramics and polymers into heterogeneous systems. Their performances usually depend on the interplay between properties defined by the atomic, nano/mesoscopic and microscopic structure. In-situ and in-operandi investigations will be in the focus of such investigations. The instrument HEIMDAL proposed for the European spallation neutron source ESS will offer here perfect prospects, as the instrumental resolution of this powder diffractometer can widely be adapted taking either full advantage of the broad pulse of ESS (2.86ms) offering highest intensity, or using a fraction of the pulse for highest resolution. A thermal and a cold guides pointing to the same virtual source extend the spatial window of the instrumental from an atomic scale (0.3Å-1≤Q≤50Å-1) to a nano/meso scale, 0.002Å-1≤Q≤0.1Å-1 by adding a narrow-band SANS instrument behind. Our chopper system allows switching the different operation modes electronically. Traditionally such structural information has been collected in separated experiments such as powder diffraction (PD), wide angle diffraction scale, small angle diffraction and direct space imaging techniques (sub-micronic to millimeter scale), whereas HEIMDAL can offer these options in its final stage at the same time at therefore for absolutely identical experimental conditions. The top-loading geometry foreseen not only accepts auxiliary from the ESS pool (cryogenics, pressure cells, magnets) but also allows implementing bulky brought-in user equipment. It can be pretested off-line at the instrument, but already fully connected to the HEIMDAL electronics. Figure 1: a) Operation modes of the HEIMDAL b) Layout of the instrument HEIMDAL



Keywords: diffractometers, ESS, in-situ