POWTEX Neutron Diffractometer at FRM II Garching: Current status and instrument characteristics

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Abstract

The **POW**der and **TEX**ture TOF Neutron Diffractometer POWTEX at FRM II research reactor in Garching near Munich is also designed for in-situ time-resolved deformation and recrystallisation texture experiments. Thereby, it will be equipped with a large cylindrical detector coverage (Jacobs et al. 2015) and designed to high flux (Houben et al. 2012). The detector resolution is sufficient for strong recrystallisation textures and it's coverage allows texture measurements with minimized sample tilting and rotation. Furthermore, the detector dimensions allow for larger sample environments. Up to date two dedicated sample environments exist for POWTEX. The first sample environment allows in-situ triaxial deformation experiments on (geological) materials including ice in max. principle stress of 630 MPa and strain rates of 1e-3 to 1e-7 se-1 with axial strains of up to 50%. This deformation apparatus is equipped with a spindle drive, which also allows simultaneous/combined tensional stress/strain and texture measurements. The second sample environment is a rotatable mirror furnace with laser heating for in-situ recrystallisation analysis in 3D of polycrystalline material by orientation stereology.
A specially designed software named EasyTexture App was programmed for POWTEX to convert the cylindrical detector data to texture intensity resolved spectra, which can be processed with the MAUD software package by Lutterotti et al. 2007. This allows the users to process the diffraction data from POWTEX with a well-established and leading tool for processing texture data. The described sample environments and software can be used equivalently at the neutron diffractometer DREAM, which will be established at the European

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References:

Houben, Andreas; Schweika, Werner; Brückel, Thomas; Dronskowski, Richard (2012). DOI:10.1016/j.nima.2012.03.0

Jacobs, Philipp; Houben, Andreas; Schweika, Werner; Tchougre'eff, Andrei L., Dronskowski, Richard (2015). DOI:10.1107/S1600576715016520
Lutterotti, Luca; Bortolotti, Mauro; Ischia, Gloria; Lonardelli, Ivan; Wenk, Hans-Rudolf (2007). DOI:10.1524/zksu.2007.2007.suppl_26.125

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