Journal of Geophysical Research: Solid Earth
Volume 120, Issue 1, Pages 121-131

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

Jens Walter*, Christian Randau†, Oleksandr Koshchii‡, Michael Stipp§, Bernd Leiss∥, Klaus Ullemeyer¶, Helmut Klein†, Bent T. Hansen†, Werner F. Kuhs†, Andreas Houben†, Werner Schweika∥, Andrew Sazonov§, Irina Stefanescu¶, Florence Porcher∥, and Jonas Kley

1Geowissenschaftliches Zentrum, Georg-August Universität Göttingen – Germany
2Forschungszentrum Jülich – Germany
3Institut für Geowissenschaften und Geographie, Martin-Luther-Universität Halle – Germany
4Kiel University – Germany
5Institut für Anorganische Chemie, RWTH Aachen – Germany
6European Spallation Source (ESS) – Sweden
7European Spallation Source ERIC – Sweden
8European Spallation Source ERIC – Sweden
9Laboratoire Léon Brillouin UMR 12 CEA – Laboratoire Léon Brillouin UMR 12 CEA – France
10Geowissenschaftliches Zentrum, Georg-August Universität Göttingen – Germany

Abstract

The POWder and TEXture 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 its 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 s-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...
Spallation Source ESS research facility in Lund, Sweden.

References:

Houben, Andreas; Schweika, Werner; Brückel, Thomas; Dronskowski, Richard (2012). DOI:10.1016/j.nima.2012.03.015

Jacobs, Philipp; Houben, Andreas; Schweika, Werner; Tchougare'eff, Andrei L., Dronskowski, Richard (2015). DOI:10.1107/S1600576715016520


**Keywords:** Neutron Diffraction, Deformation and recrystallisation textures, Geological materials, Crystal plasticity