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Epsilon - german time-of-flight high resolution neutron diffractometer at the high flux pulsed reactor IBR-2: current status and scientific applications

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The TOF diffractometer Epsilon at the beamline 7a of the IBR-2 reactor is dedicated to the high resolution measurements of applied and residual strains of geological samples and functional materials.
A four-axis goniometer permits a rotation around one axis and translation in 3 mutual perpendicular directions. It allows us to measure a strain profile of six independent component of strain tensor. Last years Epsilon had been equipped by variety of dedicated sample environment:
- uniaxial pressure device with possibility of sample rotation under external load with maximal pressure up to 150 MPa for operando measurements;
- an acoustic emission system;
- a laser extensometer for macroscopic deformation measurements of the sample with a resolution of 0.5 μm,
- a triaxial pressure device for operando stress measurements, which allows us in situ determination of Poisson ratio, the bulk modulus and Biot-Willis coefficient.
Epsilon is perfect fitted to the geological application and material sciences, the sample environment is unique and has no analogy through the neutron spectrometers in the world.

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