The ANKA-PDIFF beamline is a facility for hard x-ray diffraction investigations of bulk polycrystalline materials under varying in-situ conditions and for high-resolution powder diffraction, residual-stress and texture measurements. It is also equipped to perform scattering studies on thin films and epitaxial layers.

Contact
Dr. Stephen Doyle
Phone +49 721 608-28194, fax +49 721 608-26172
Email stephen.doyle@kit.edu

ANKA – the Synchrotron Radiation Facility at KIT
www.anka.kit.edu/english

Equipment for X-ray diffraction in the hard X-ray energy range (6keV-20keV) and for crystallographic structure and microstructural characterisation of bulk and thin films solids

- Heavy-load 3-circle powder diffractometer with variable detector configurations
- Smaller 4-circle diffractometer with variable detector configurations
- Sample heating, cooling and deformation equipment

Experimental facility
The experimental facility consists of two experimental stations:

1. a heavy-duty 3-circle powder diffractometer capable of carrying sample loads up to approx. 60kg and multiple detector systems for real-time investigation of structural changes in polycrystalline materials. Experiments can be carried out on small sample volumes (a few milligrams), in either transmission or reflection geometries. The diffractometer is equipped with 2 main detectors: a large CCD camera and a 90° 1D detector for simultaneous registration of x-ray scattering over a large angular range.

2. for experiments requiring additional orientational degrees of freedom, for example for texture and stress analyses in thin films a 4-circle Kappa diffractometer carrying up to approx. 5 kg loads and equipped with either analyser or Soller collimator optics for high angular resolution studies is available. While the instrument is normally equipped with detectors optimised for angular and energy resolution it can also optionally carry the CCD or 1D linear detectors.

Various diffraction geometries can be accommodated, for example symmetric and asymmetric reflection and transmission with and without sample rotation. Typical time resolution for in-situ studies depends exactly upon the chosen detector setup but can be down to the order of 1 second for powder patterns recorded with either 1D or 2D detectors. Typical measurement times for high-resolution powder scans are between 2 and 6 hours depending on the sample scattering power. Spatial resolution (at the sample) is of the order of .05mm without undue intensity losses.