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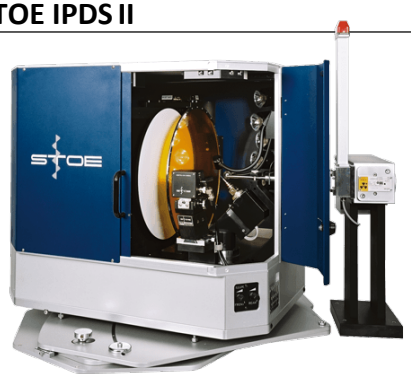
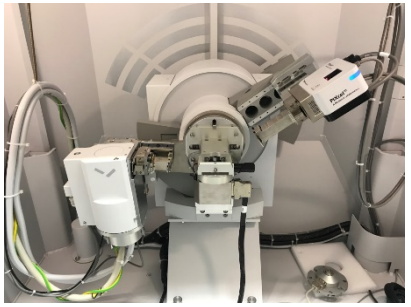
Materials Science and Technology

X-ray diffraction and scattering: equipment at the Center for X-ray Analytics (1)

Instrument	XRD Bruker DaVinci D8 Discovery	STOE IPDS II	STOE IPDS 2T	PANalytical X'Pert Powder
Picture				
Type	X-Ray Reflectometry (XRR), High-Resolution X-Ray Diffraction (HRXRD), Reciprocal Space Mapping (RSM), Grazing Incidence Diffraction (GID), In-Plane Grazing Incidence Diffraction (IP- GID), Grazing-Incidence Small Angle X-ray Scat- tering (GISAXS)	Diffraction in Transmission	Diffraction in Transmission	Powder X-Ray Diffraction (XRD), high temperature and reactive gases are possible. Bragg-Brentano setup or focussed beam (Göbel mirror) for capillaries.
X-ray source	Cu (λ = 1.5406 ÅCu Kα)	Mo (λ = 0.71073 Å MoKα)	Ag (λ = 0.5608 Å MoKα)	Cu (λ = 1.5406 ÅCu Kα)
Probed Area	Depends on source configuration line or point focus	300 –800 µm	300 –800 µm	20 mm × 0.1-6 mm
Max 2θ	150°	77°	137° by turning the gomiometer around Θ	150°
Detector	Double detector arm with PATHFINDER and LYNXEYE detector	Diameter Image Plate (active area) 340mm 40 – 200 mm (automatically set)	Diameter Image Plate (active area) 340mm with 40 – 200 mm sample to detector distance (automatically set)	PIXcel 1D
Sample di-mensions and weight	Thin films, Semiconductors, Bulk, and powder	single crystals, or powders in capillaries, fibers	Single crystals, or powders in capillaries, fibers	Powders in flat holders (2 cm diameter; 1 mm depth) Powders in capillaries Small bulk specimens (45 mm diameter, 7 mm thickness)

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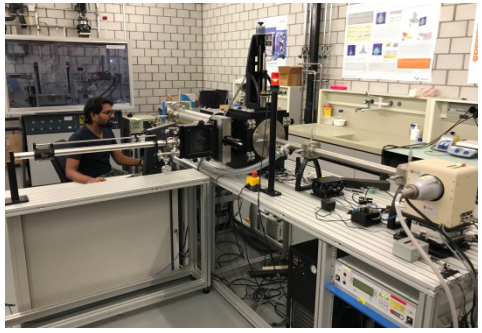
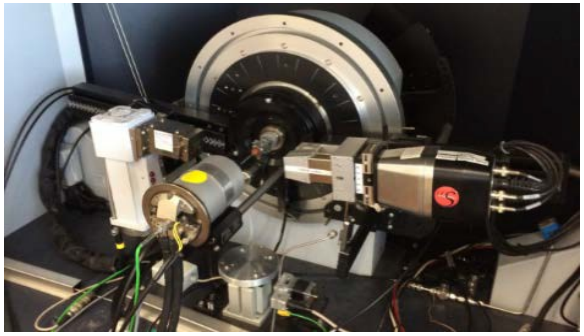
X-ray diffraction and scattering: equipment at the Center for X-ray Analytics (2)

Instrument	Bruker NANOSTAR U (SAXS/WAXD)	MOLMET	XRD Bruker D8
Picture			
Type	Diffraction in transmission. Stages: tensile stage (5N, 600N), heating stage (room temp. to 300°C), PHI stage, tilt stage. Grazing-Incidence Small Angle and Wide Angle X-ray Scattering (GISAXS/GIWAXS). Sam- ple chamber evacuated (normal setup), but can also be held at normal pressure.	Operational in transmission and reflection modes; Similtaneous SAXS/WAXD: a 2D gas detector at largs SDDs and image plate at short SDDs; Linkam stages for temperature control -30 < T <150;	Powder X-Ray Diffraction (XRD), high temperature and reactive gases are possible. Parallel beam setup.
X-ray source	Cu (λ = 1.5419 Cu Kα). Microfocus X-ray source, MONTEL optics (Goebel mirror) with 2-pin collimation system. Beamstops: various diameters and shapes (Ø 2 to 5 mm for SAXS and WAXD, rectangular for GISAXS)	Cu (λ = 1.5419 Cu Kα) radiation with Osmic confocal Max-Flux, 3-pinhole setup with various size pinholes; equipped with diode-loaded beam stop	Cu (λ = 1.5406 ÅCu Kα)
Probed Area	Depends on pinhole size. Pinhole diameters currently available: 300 µm and 550 µm.	Depending of the mode of operation and detector used; Accessible d-spacing 0.2 Å to 100 nm	20 mm × 0.1-6 mm
Max 2θ	Sample-to-detector distance can vary from 4.5 to 147 cm, with max 2 θ from 39° to 2.6°.	Sample-to-detector distance can vary depending on detector type (image plate or 2D gas detector)) providing Maximum 2Θ of 60°	150°
Detector	VÅNTEC-2000 Xe-based gaseous avalanche detector. Active area: 14 cm x 14 cm, 2048 x 2048 pixels, pixel size 68 µm x 68 µm.	Molecular Metrology-Rigaku gas wire detector; 120 mm in diameter of detector area of 1024×1024 pixels; Pixel size=120 µm	Vantec-1 PSD
Sample di- mensions and weight	Sample chamber dimension is spacious enough for designing new sample holders; Various sample holders are available for fibers, films, liquids , gels and powders.	Sample chamber dimension is spacious enough for designing new sample holders; Various sample holders are available for fibers, films, liquids , gels and powders.	Powders in flat holders (2 cm diameter; 1 mm depth) Powders in capillaries Small bulk specimens (45 mm diameter, 7 mm thickness)

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