X-RAY POWDER **DIFFRACTION** PANALYTICAL EMPYREAN, PANALYTICAL X'PERT PRO MPD

X-ray powder diffraction is fast nondestructive physical method commonly used for structural and phase analysis of crystalline phases and determination of particle and crystallite size of nanocrystalline materials. X-ray powder diffraction with employed high-temperature/reaction chamber can be utilized for all above mentioned analysis in non-ambient conditions (i.e., elevated temperature and/or gas pressure), and furthermore, for performing in-situ monitored thermally induced solid state reactions and solids-gas reactions.

ACQUIRED INFORMATION

- Identification of crystalline phases
- > Quantitative phase analysis
- Determination of amorphous phase content
- > Structural analysis of powder samples
- > Determination of particle size
- > Determination of Mean X-ray Coherence Length (MCL)
- > Determination of residual stress in (nano)material samples
- Monitoring and determination of structural/phase transformations in non-ambient conditions
- > Determination of temperature dependent dilatation

SAMPLE TYPES

- > Powder (nano)materials
- Bulk nanostructured materials (maximal sample size: diameter 140 mm, height 64 mm, weight 2 kg)
- > Thin films
- > Liquid samples (measured in capillary)
- Above mentioned types of samples unstable in the air (measured in protective Kapton foil)

MODES, CONDITIONS AND PRECISION

- > θ - θ Bragg-Brentano parafocusing geometry (2 θ range: 0 145°)
- > Co K α radiation (λ = 1.79031 Å)
- > Reflexion/transmission configuration
- > Grazing incidence (GI) regime
- > Small Angle X-ray Scattering (SAXS)
- Measurement in various temperatures (25 1200 °C)
- > Oxidative (1200 °C)/inert (1200 °C)/reductive (900 °C) atmosphere/vacuum (1200 °C)
- > Variable pressure (1 mbar 10 bar)



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X-ray Powder Diffractometer (Empyrean, PANalytical, B.V.)



Diffraction pattern and quantitative phase analysis of measured sample

DETAILED INFORMATION ON REQUEST



Palacký University Olomouc