

# Ceramic Materials

### Synthesis of powders and ceramics

- Powder preparation, e.g. precipitation, colloidal processing
- Powder surface modification, selection and design of process additives
- Polymer derived ceramics
- Shaping, e.g. casting, pressing, new shaping techniques
- Additive manufacturing, 3D printing – stereolithography, powder printing, microextrusion
- Coatings (polymer derived ceramics, sol-gel, enamel, glazes)
- Sintering, up to 1800 °C under vacuum, reactive or protective gases

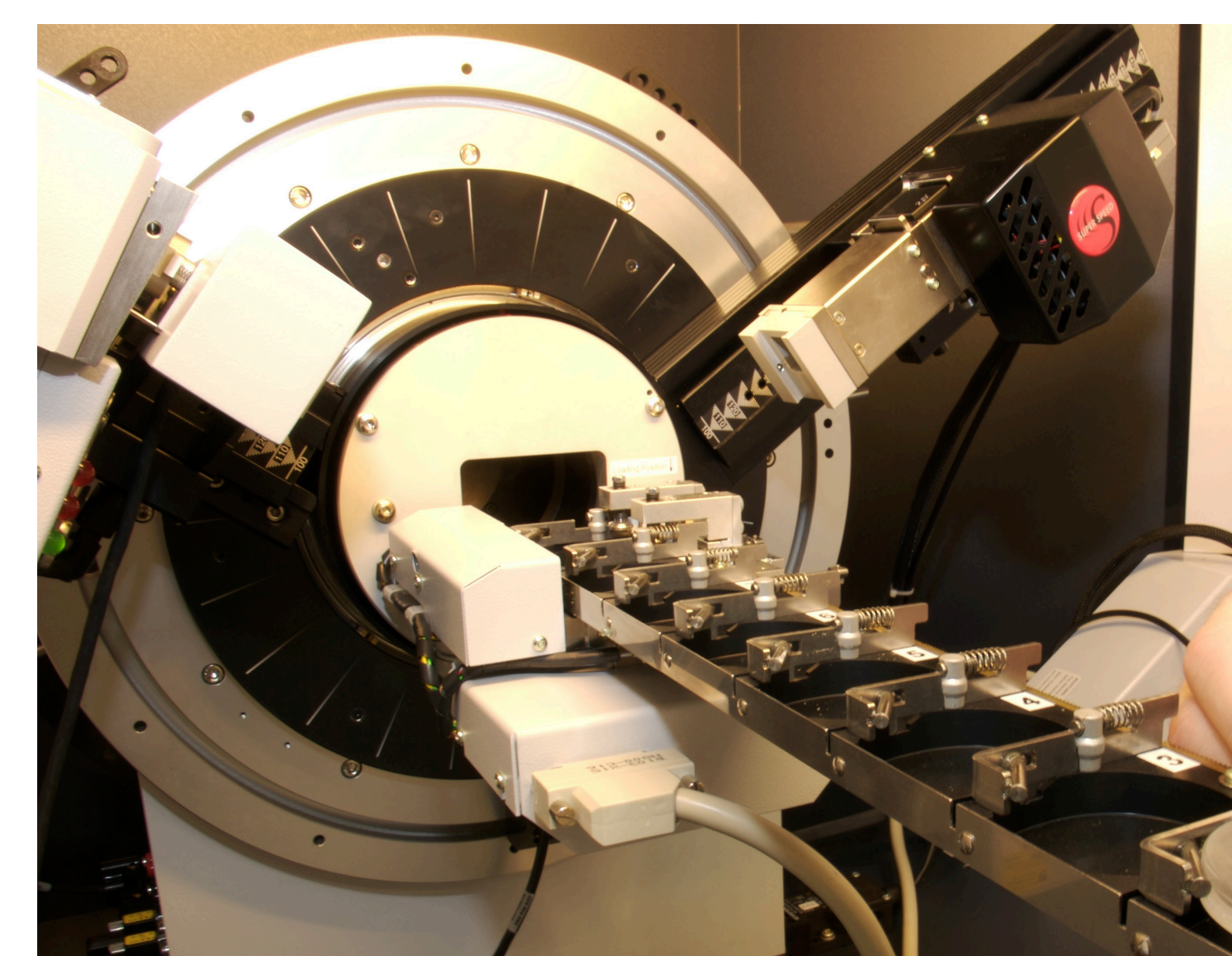
### Characterisation

- Crystal structure and phase composition of powders and ceramics (XRD x-ray diffraction)
- Thermal and chemical analysis of powders and ceramics
- Investigation of mechanical properties of ceramics
- Microstructure and defects
- Surface properties

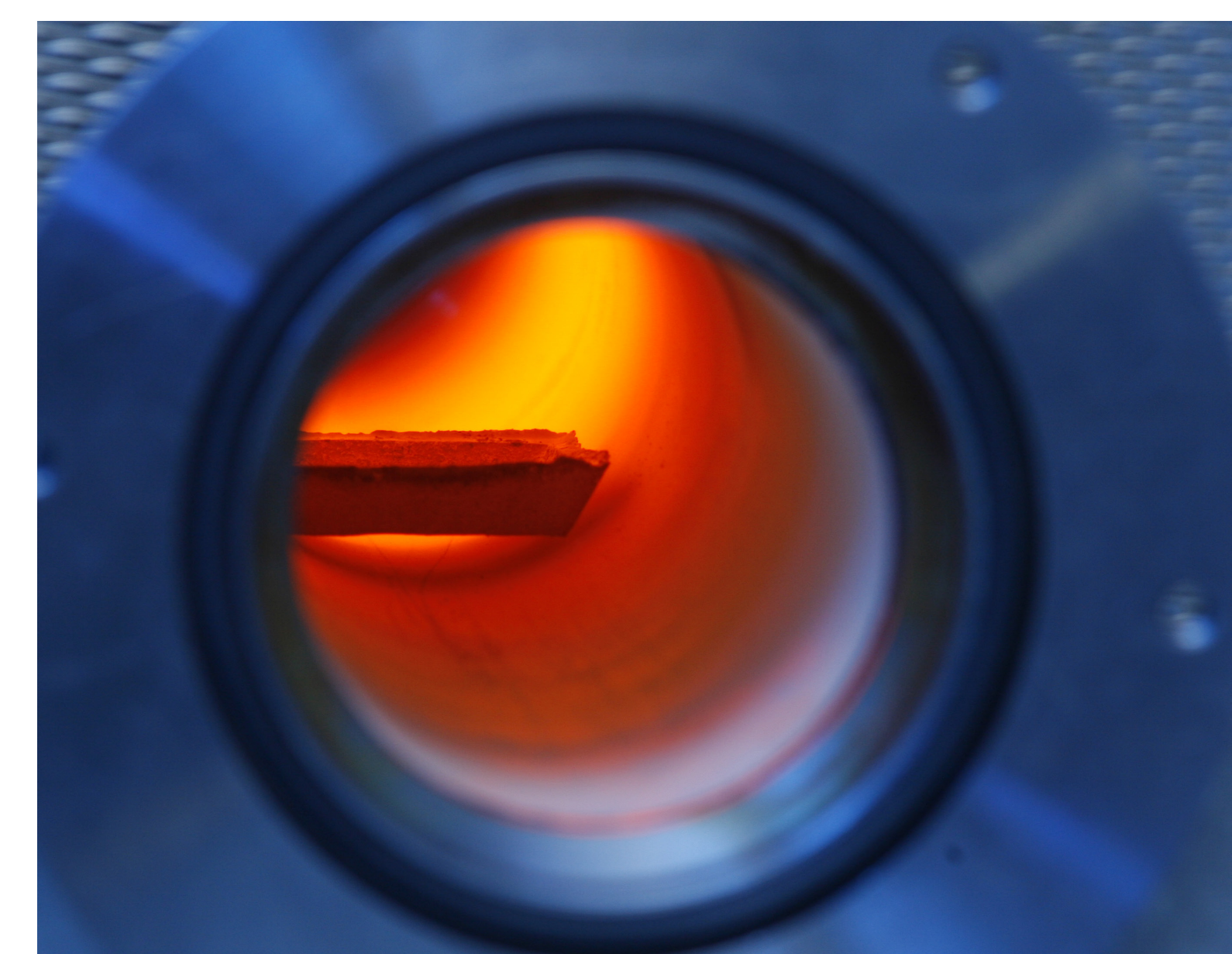
### Applications

Advanced ceramic materials are used in a wide range of industrial applications as functional materials e.g.

- Separation (membranes, filters)
- Electronic devices (active and passive elements)
- Energy conversion (SOFC Fuel Cells, batteries)
- Thermal management (insulation, thermal barrier, refractory materials)
- Materials for extraordinary mechanical and chemical property requirements



X-Ray diffraction system



View inside a tube furnace



Laboratory samples of advanced ceramics

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