Topic C: Characterization

C07: In-situ analysis of materials via X-ray, neutron or electron diffraction

In-situ diffraction using X-rays, neutrons, or electrons has become an indispensable tool in contemporary materials research. The relevance of in-situ diffraction stems from the ability to provide crucial insights into the structural, chemical, and dynamic properties of materials under (close to) real-world conditions.

The recent years have brought rapid advancements in instrumentation and data analysis, opening new opportunities for studying a wide range of structures and behaviours. Innovative multimodal approaches allow to correlate diffraction-based insights with complementary information, for instance by combining diffraction with spectroscopy, calorimetry, tomographic or thermographic imaging. Powerful numerical tools like machine learning facilitate efficient and swift processing of large and complex datasets.

The objective of this symposium is to discuss recent advances in characterizing material behaviour via in-situ diffraction techniques using X-rays, neutrons or electrons. The focus lies on evaluating microstructural changes for specific or operando scenarios including (but not limited to) mechanical loading, heating/cooling, physical or chemical reactions, or exposure to various atmospheres. Contributions on all diffraction techniques are welcome, related (but not constrained) to the following topics:

- Structural and functional materials
- Catalytic processes and chemical reactions
- Energy materials incl. batteries and fuel cells
- 1D, 2D and 3D nanomaterials
- Geological materials and processes
- Recycling and sustainability

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