

Spatial and temporal exploration of heterogeneous catalysts with synchrotron radiation

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Solid catalysts are highly complex, porous, multi-elemental and often hierarchically structured materials. Scientists are therefore confronted with a formidable challenge to understand the functioning of solid catalysts and, based on this knowledge, to design and make materials with superior performance and overall stability. Because solid catalysts often change during their operation microspectroscopy is a valuable tool for both in-situ and ex-situ catalyst characterization [1]. In this presentation I will focus on our latest work using different microscopy and microspectroscopy techniques in 2-D and 3-D and using synchrotron radiation to investigate whole catalyst bodies at the meso- and macro-pore scale. Special emphasis will be put on 3-D studies using synchrotron based X-ray microscopy providing detailed information about the morphological changes that take place during operation of a fluid catalytic cracking catalyst that is used to showcase the power of state-of-the-art X-ray imaging techniques.

[1] F. Meirer and B.M. Weckhuysen *Nat. Rev. Mater.* **3**, 324–340 (2018).