

“In situ and operando hard X-ray tomography from micro- to nanoscale: opportunities and applications in catalysis and materials science”

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The study of heterogeneous catalysts and functional materials while performing specific chemical functions (in situ) and with simultaneous collection of product information (operando), are key concepts in modern chemistry research. At the same time, the penetrating power of hard X-rays allows for the imaging of interior structural features in a non-invasive manner and with a variety of contrast modes through application of tomography. Here we will explore recent developments in sample environments and experimental infrastructure for collecting tomographic data of catalysts at work, from the micrometer scale (STXM, XRD tomography) to the nanometer scale (X-ray ptychographic computed tomography). Experimental possibilities with the upcoming EBS upgrade will be highlighted particularly for coherent and high energy imaging, but also including applications under high pressure and temperature regimes.