
# Lineup of XAFS measurement techniques at SPring-8

Recently, temporally and spatially resolved XAFS measurement techniques have been developed at the public beamlines in SPring-8. Here is a summary of three state-of-the art XAFS measurement techniques, quick XAFS, 2D microXAFS, and laminography XAFS, which have been developed at SPring-8.

Quick XAFS and energy dispersive XAFS (DXAFS) have been used for time-resolved studies of transient processes. Quick XAFS is advantageous over DXAFS for the measurement of samples that are either very dilute, very thin, spatially-inhomogeneous, or strongly scatter X-rays. A millisecond time-resolved quick XAFS system with a compact channel-cut monochromator driven by a galvano motor was developed, which was used with low heat load helical undulator radiation at BL40XU [1]. This system was used to investigate the structural kinetics of cathode catalyst in a polymer electrolyte fuel cell (PEFC) during voltage-operating processes [2] and the mechanism of metal nanoparticle formation in solution [3]. This capability was incorporated at the contract beamline BL36XU, which was recently built for studies on fuel cells.

A fast scanning 2D microscopic XAFS measurement system using a 100-nm beam, focused by Kirkpatrick-Baez mirrors, was developed at BL37XU and BL39XU [4]. Spatial distributions of the oxidation states in single catalyst particles were visualized using this system [5].

A computed laminography XAFS measurement system was developed at BL47XU [6]. This system allows the 3D microscopic XAFS of laterally extended planar objects. Non-destructive imaging of the chemical state of cathode catalyst elements in a PEFC was performed at a spatial resolution of about 1 μm using this system (Figs. 1,2,3).

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References
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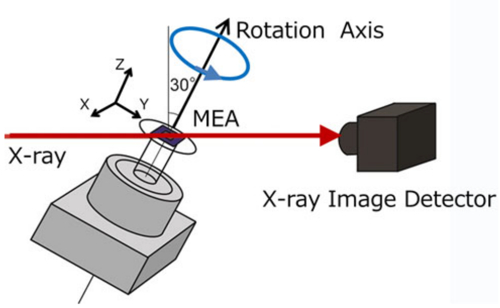


Fig.1 Setup for laminography XAFS measurement.

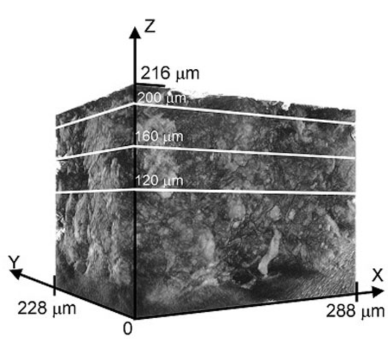


Fig.2 3D Pt distribution image.

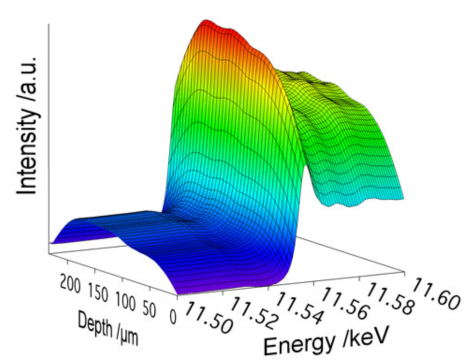


Fig.3 Depth-resolved Pt L3-edge XANES spectra in degraded membrane-electrode