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In-situ and in-operando XAFS spectroscopy in the ms range at beamline P64 at PETRA III, DESY

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The beamline P64 at the high brilliance source PETRA III at DESY houses a dedicated quick-EXAFS monochromator for spectroscopy in the ms range and offers special equipment for in-situ and in-operando experiments. The monochromator consists of Si(111) and Si(311) crystals on an oscillating stage with frequencies of up to more than 50 Hz enabling spectra in the ms range. In the experimental hutch fast and custom-built gridded ionization chambers and amplifiers with precise ADCs are available to record the data with sufficient bandwidth continuously during experiments of up to a few hours. Lately, a 2-circle goniometer with linear table for reflectivity measurements was installed and commissioned. At incident angles between 0.1 and 0.8° the information depth can be varied between a few monolayers and some 10 nm. Additionally, a PIPS detector for fluorescence with a matched amplifier was tested at oscillation frequencies of up to 120 Hz. It can be used for surface sensitive experiments, for thicker samples where transmission is not possible, or for absorbing elements in concentrations down to 100 ppm or less. Several beamtimes with in-situ or in-operando catalysis experiments have been carried out successfully. The surface sensitive reduction of steel surfaces in different gas atmospheres at up to 1100°C was investigated in other experiments. All equipment is available for users, and the beamline is open for beamtime applications.

Primary authors: Mr BORNMANN, Benjamin (Bergische Universität Wuppertal); Mr KLÄS, Jonas (Bergische Universität Wuppertal); Dr MÜLLER, Oliver (SSRL); Mr WABNITZ, René (Uni Wuppertal); Mr WAGNER, Ralph (Bergische Universität Wuppertal); LÜTZENKIRCHEN-HECHT, Dirk (Bergische Universität Wuppertal); Prof. FRAHM, Ronald (Bergische Universität Wuppertal)

Presenter: Mr BORNMANN, Benjamin (Bergische Universität Wuppertal)

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