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Development of a Lab-based In-situ NAP-XPS System for SOFC and Electro-Catalysis Research

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We present the development of a lab-based near ambient pressure X-ray photoelectron spectrometer (NAP-XPS) that was specially designed for investigations of electro-catalytic systems and SOFC materials under realistic operating conditions. The new system allows catalytic measurements in flow mode with online reaction analysis while simultaneously characterising in-situ surface composition and electrochemical properties.

Key requirements are a flow reactor environment that can be operated up to 10 mbar H₂ (or other gases and gas mixtures) with operating temperatures between RT and 800 °C (peak temperatures of 1000 °C possible). The sample stage has special design to allow simultaneous characterisation by impedance spectroscopy and to obtain current-voltage curves. For electro-catalytic experiments, the sample surface can be polarized. The attached gas analysis allows to follow catalytic reactions in real time by MS.



Figure 1: 3D Model of the in-situ NAP-XPS system.

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