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Operando soft X-ray Absorption Spectroscopy in unveiling the mechanisms of heterogeneous reactions: a case study on High Entropy Oxides

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High Entropy Oxides (HEOs) are a recent class of materials where the configurational entropy of mixing is thought to be the main term in the Gibbs free energy of formation. Although the role of configurational entropy as a stabilization term for these compounds is still debated, these materials display a number of promising properties such as anode material in Li-ion batteries, or as large κ dielectric material, fast ionic conductors, or as catalytic materials. The “high entropy paradigm” requires that at least five different cations are mixed in equimolar fractions in the oxide structure, and the intrinsic multicomponent nature of these materials renders the individuation of the atomic mechanisms leading to the relevant functional properties of the HEOs a particularly difficult task. Here we show that Operando X-ray Absorption Spectroscopy represents an invaluable tool in this respect, specifically where the interfacial properties are involved, and in particular in the energy region of the soft X-rays. Examples are thus given in the field of catalysis and electrochemistry (anode material in Li-ion batteries).

if “Other”, please specify:

I apply for a travel grant

No

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