4th XAS Journal Journal Club from Europe and Asia-Oceania

X-ray absorption spectroscopic investigation for defect-/interface-engineered hybrid materials with efficient catalysts and electrode functionalities

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Monolayered 2D nanosheets of layered metal compounds (layered metal oxides, layered double hydroxides, transition metal dichalcogenides, and layered metal carbides) have attracted intense research interest because of their unique physicochemical properties and useful energy-related functionalities. These monolayered inorganic nanosheets can be synthesized by soft-chemical exfoliation reaction and used as efficient 2D building blocks for superlattice nanohybrids, porous nanocomposites, freestanding hybrid films, etc. The wide 2D surface area, very thin thickness, and high electrochemical and catalytic activities render these inorganic nanosheets promising materials for energy production and storage. For understanding an origin of the outstanding functionalities of 2D nanosheet-based hybrid materials, we have utilized X-ray absorption spectroscopy (XAS) to probe the evolutions of local crystal structures and electronic structures upon the hybridization. In this talk, I will present several examples of high-performance energy-functional 2D inorganic nanosheet-based hybrids together with their unique physicochemical properties and functionalities characterized by XAS technique.

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