

Operando X-ray Spectroscopy Studies of CO₂ Reduction Reaction Mechanism on Ni and Ni Alloy Catalysts

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Operando Grazing incidence XAS and XRD at beamlines 11-2 and 2-1 of SSRL is utilized to study the electrode-electrolyte interface on various transition metal and metal alloys as candidates for CO₂ reduction electro-catalysis. An in house designed 3D printed flow cell accommodates a thin layer of 300-micron electrolyte above the catalyst surface, thus enabling measurements in grazing incidence mode. Our operando GIXRD and GIXAS paint a picture of an evolving Ni surface, with slow reduction of surface oxide/hydroxide and changing crystal orientations.