Contribution ID: **50** Type: **Invited/plenary talk**

INVITED: In situ/operando characterization of solid-liquid electrified interfaces by total electron yield X-ray absorption spectroscopy (Chair Simon Mun)

Thursday, 8 December 2022 13:30 (30 minutes)

The electrodeposition of metal ions onto an electrode is influenced by several phenomena, such as diffusion, ion-water interactions, and adsorption. Probing these underlying aspects is technically challenging due to the lack of techniques that are only sensitive to the electrode-electrolyte interface. Here, we have used a novel X-ray spectroscopy method to overcome this issue, where interface-sensitive X-ray absorption spectra are obtained by separation of a frequency modulated X-ray current (AC) signal from the continuous electrochemical current (DC). Using this approach, the electrode-electrolyte interface was followed during copper electrodeposition. The detection of O K-edge and Cu L-edges spectra enabled the observation of the surface structure of the electrode, as well as the near-surface Cu2+ ions concentration and the interfacial water structure, providing a very complete picture of the deposition process. We find that the Cu2+ ions are reduced via an atom transfer mechanism, where a Cu2O or CuOH intermediate is formed rather than the simple Cu+. This result highlights the complexity of interfacial electrochemistry, and the need to resolve it in molecular-level detail.

if ”Other”, please specify:

I apply for a travel grant

No

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Track Classification: Electrochemistry/electrocatalysis