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Characterisation of an Antimony-based Catalysts for Acid Water Oxidation Catalysis – Insights through X-ray Absorption Spectroscopy and the challenges of multi-metal systems

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Electrochemical water splitting with a proton-exchange membrane electrolyte provides many advantages for the energy-efficient production of high-purity dihydrogen in a sustainable manner, but the current technology relies on high loadings of expensive and scarce iridium at the anodes, which are also often insufficiently stable in operation. A common strategy to achieve stability is to synthesise composite oxides composed of multiple components, for example [M]SbOx, [M]PbOx, [M]BiOx. Yet, these materials pose a challenge in that it is not well understood how the mixed metal works to stabilise the material under acidic conditions. The present work presents an efficient ruthenium antimony oxide (RuSbOx) electrocatalyst synthesised as a thin film on fluorine-doped tin oxide (FTO). Comprehensive physical characterisation by X-ray absorption spectroscopy (XAS) and transmission electron microscopy (TEM) reveals important insights into the structure and mechanism of the examined materials while simultaneously highlighting how structural effects, such as disorder, may impact the observation and interpretation of EXAFS data.

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

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