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The investigation of structural and electronic configurations of noble-metal free nanocomposite and electrocatalytic oxides for acidic water electrolysis

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The development of *in situ* XAS for water electrolysis applications, such as sustainable hydrogen production, is integral towards the accurate characterisation of state-of-the-art electrocatalytic materials. As this field continues to uncover a breadth of earth-abundant and high performance electrocatalysts, the understanding of their operando structures and electronic states is required to not only understand the true nature of these electromaterials, but also precisely bench-mark emerging catalysts and catalytic mechanisms against already industrially dominant electrocatalysts. Due to its intrinsically conductive nature, and the purity of hydrogen that is produced at industrially relevant current densities, acidic water electrolysis presents one of the most capable modes of producing hydrogen sustainably at the terawatt scale. It is from these perspectives that the development of cost effective, acid stable and highly active catalytic materials must be developed and characterised in order to make this technology increasingly feasible for deployment at the global scale. Operando XAS has been instrumental in our recent developments towards two intrinsically stable electrocatalysts that are based off cobalt-rion-lead and silver-bismuth mixed oxides, and the now refined understanding of "catalyst-in-matrix" mechanisms of operation. During our XAS work at ANSTO we have been successful in collecting high quality XANES and EXAFS data on the two acid stable materials described, whereby structural and electronic information would not have been uncovered under *ex situ* XAS experimental designs. From the detailed results obtained, we are now refining our *in situ* XAS technique for a breadth of acid-stabe materials that have been developed within our team at Monash University and believe that this will benefit the field towards precise bench-marking metrics for cost effective electrocatalysis.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

He/Him

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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