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Operando investigation of a lead-acid battery with the IMBL.

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Lead-acid batteries play a key role in the energy storage marketplace. They are often cheaper, safer and more recyclable than alternative electrochemical energy storage systems. Under traditional energy storage applications such as starting, lighting and ignition batteries, they provide a great balance of affordability, lifespan and performance to the consumer. However, as the demands placed on energy storage systems have increased over recent decades, lead-acid batteries have been shown to have a markedly shortened lifespan. Investigations have found the cause of this failure is related to an uneven utilization of active material in the Pb electrode. Although, the process whereby uneven utilization of active material leads to a significant reduction in cycle-life has yet to be determined. Typically, investigations of uneven material utilization are conducted after the fact and are destructive (EPMA, SEM, XRD etc.). Our project aimed to determine whether the IMBL could be a suitable candidate for non-destructive, operando investigations into active material utilization. To achieve this, a lead-acid cell was designed specifically for the IMBL. It was cycled whilst being simultaneously imaged at 85 keV, with an exposure time of 0.8 s at a resolution of 5.8 μm. Results show that key reaction products could be observed in-situ and furthermore they could be localized within certain regions within the Pb electrode. We show that the IMBL could be a powerful tool to further the current understanding of lead-acid batteries.

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

No

Condition of submission

Yes

Primary author(s) : Mr STONE, Chad (Swinburne University of Technology); Dr MAHON, Peter (Swinburne University of Technology); Dr HOCKING, Rosalie (Swinburne University of Technology); Dr HOLLENKAMP, Anthony (CSIRO); Dr NEWNHAM, Russell (Electric Applications Inc.); Dr HALL, Chris (Australian Synchrotron)

Presenter(s) : Mr STONE, Chad (Swinburne University of Technology)

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