Contribution ID: **69** Type: **Oral**

Recent progress on synchrotron radiation based operando characterization of battery materials at Alba Synchrotron

Tuesday, 6 September 2022 10:25 (20 minutes)

Operando synchrotron radiation-based characterization techniques applied to energy storage materials are becoming a widespread characterization tool as they allow for non-destructive probing of materials with various depth sensitivities through spectroscopy, scattering, and imaging techniques. Moreover, they allow for faster acquisition rates, variable penetration depths, higher spectral or spatial resolution or access to techniques that are only possible with a continuous tuneable source over a wide photon energy range. Compatibility between the electrochemical cell designs and the experimental set ups may force some specific design features and care has to be taken to ensure that these do not perturb the electrochemical response of the materials under investigation. The use of operando techniques has intrinsic advantages, as they enable the detection of metastable intermediates, if any, and ensure characterization under real conditions avoiding the risk of ex situ sample evolution during its preparation. Operando experiments are thus crucial for both the elucidation of redox mechanisms in new technologies and also understanding of failure and ageing processes for already commercial concepts.
Here we aim to give a general overview of the operando capabilities available at Alba Synchrotron related to battery research, focusing specially on the most recent advancements that have been developed in the last year under the initiative "Synchrotron radiation applied to green energy: superconducting materials, electrochemical storage and catalysis", founded by the Extended Interdisciplinary Thematic Platform (PTI+) European Union-Next Generation EU. Amongst other, we will cover the recent progresses on the implementation of operando synchrotron-based Fourier Transform infrared (SR-FTIR) Microspectroscopy for battery materials at MIRAS beamline, the first XRD&XAS operando experiment conducted at NOTOS beamline, a resume on the preliminary studies realized on a possible future operando setup for operando X-ray microscopy at MISTRAL beamline and status of the future Battery Laboratory that will be operational starting from 2023.

Would you like to participate in the Poster Prize competition?

No

Primary authors: PONROUCH, Alexandre (Instituto de Ciencia de Materiales de Barcelona); BLACK, Ashley P. (Instituto de Ciencia de Materiales de Barcelona); SORRENTINO, Andrea (ALBA Synchrotron); MARINI, Carlo (ALBA Synchrotron); ESCUDERO, Carlos (ALBA Synchrotron); FAUTH, François (ALBA Synchrotron); AGOSTINI, Giovanni (ALBA Synchrotron); YOUSEF, Ibraheem (ALBA Synchrotron); SIMONELLI, Laura (ALBA Synchrotron); Prof. PALACIN, M.Rosa (Instituto de Ciencia de Materiales de Barcelona); TONTI, Tonti (Instituto de Ciencia de Materiales de Barcelona)

Presenter: BLACK, Ashley P. (Instituto de Ciencia de Materiales de Barcelona)

Session Classification: AUSE A - 6/09/22 I