

Synchrotron X-ray techniques for the characterization of energy storage systems



Dr. Maria Valeria BLANCO

Instituto de Nanociencia y Materiales de Aragón, Zaragoza, Spain

mariavaleria.blanco@unizar.es

Abstract

In the pursuit of high-performance lithium-ion batteries (LIBs), the development and characterization of advanced electrode materials are critical. This talk will explore the use of synchrotron X-ray techniques, specifically X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS), to study LIB anode materials. Synchrotron XRD reveals atomic-level structural changes, providing insights into phase transformations and crystallinity during electrochemical cycling. XPS, on the other hand, analyzes surface chemistry and oxidation states, uncovering the formation of solid-electrolyte interphase (SEI) layers and other key surface phenomena. By combining these techniques, we can better understand the mechanisms behind anode performance and degradation, guiding the development of more durable and efficient LIBs. The talk will also discuss the specialized experimental setups, including in situ and operando configurations, required for real-time monitoring of material behavior during battery operation.

Bio

Maria Valeria Blanco obtained her PhD in Engineering Sciences (Balseiro Institute, Argentina) on the synthesis and characterization of hydrogen storage materials. Then, she joined the European Synchrotron Radiation Facility (ESRF, France) to work on the in situ/operando characterization of energy storage devices by X-ray scattering techniques and the Norwegian University of Science and Technology (NTNU, Norway) to study Lithium-ion battery anode materials by a toolset of advanced characterization techniques. Currently she works as a Maria Zambrano Researcher at the Institute of Nanoscience and Materials of Aragon (INMA) on the study of structure-property interplay of sustainable materials for Li-ion battery technology.