

Bio-Imaging at the ALBA Synchrotron: A Multimodal and Multiscale Experience

Authors : Alessandra Patera, Victorien Bouffetier, Federico Cova, Judith Juanhuix

Abstract : Within the Life Science Section program, the Spanish Synchrotron ALBA is currently focusing on the implementation of a multi-scale, multi-technique approach to understand the behavior of biological systems. Scientific trends show a strong push towards multi-scale capabilities from the cellular up to the tissue level and from tissues to the whole organism. ALBA, with the advent of the Fast X-ray Tomography and Radiography beamline (FaXToR), will provide the user community with an instrument dedicated to μ -Computed Tomography (μ CT) with a flexible design capable of performing morphological studies at the micron scale in large volumes. Phase-contrast imaging will be feasible at FaXToR, enhancing its performance in soft tissue visualization. Herein, we show the distinct capabilities within the field of bioimaging and consider how future developments in this field planned at ALBA could further benefit the life sciences community involved in both medical research, preclinical studies and biology. The multiscale and multimodal approaches will be further explored by correlating information from different X-ray imaging systems: examples, such as in liver imaging, will be discussed. In particular, the protocol at ALBA, currently under development, for the analysis of tissues and organs with a multiscale multimodal approach will be shown. In the liver case, such protocol will focus on the investigation of the cellular and subcellular changes of the liver during cirrhosis induced by therapies. Finally, with the introduction of a comprehensive correlative analysis methodology of small murine systems and human tissues in direct collaboration with the hospitals, ALBA is paving the way to become one shop stop in biomedical research thanks to the advanced technology nowadays available, mostly dedicated, since its origin, to Life Science studies.

Keywords : phase contrast imaging, correlative analysis, liver imaging, multimodal, multiscale

Conference Title : ICRMI 2025 : International Conference on Radiology and Medical Imaging

Conference Location : Barcelona, Spain

Conference Dates : June 05-06, 2025