Guided Cryo Electron Microscopy for in-situ Structural Analysis of Cells and Tissues

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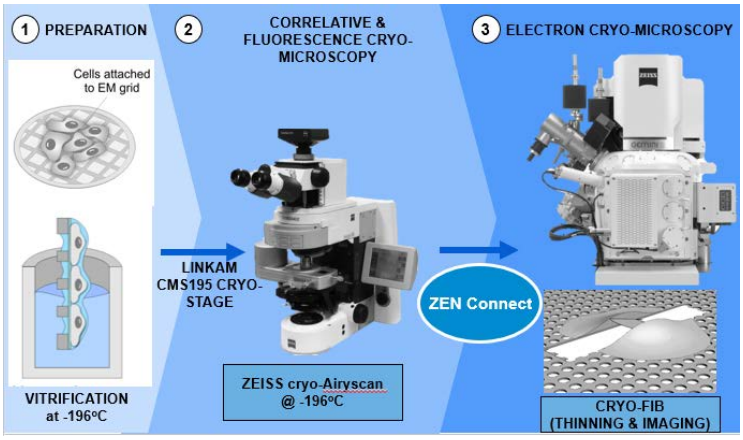
Electron microscopy imaging has been used as a valuable research tool in the Life Sciences for many years. From research of single cell organisms, viruses or eukaryotic cells to identification of synaptic contacts between neurons, the ability to image biological samples in nanometer resolution has proven to be extremely valuable for many areas of biological research. Recent advancements in the Transmission Electron Microscopy (TEM) technique using cryo-preservation namely cryo-electron tomography (cryoET is offering unprecedented insights into the inner space of cells. A major limitation of cryoET is its restriction to relatively thin samples which requires precise relocation approaches to capture the region of interest.



ZEISS offers a workflow based on correlative Super-Resolution Light Microscopy and Focused Ion-Beam Scanning Electron Microscopy (FIBSEM) offers highly automated and precise relocation perfectly suited for cryoET [1]. Furthermore, the ZEISS SEM Beam Booster technology yields state of the art contrast in vitrified unstained biological tissue of any kind which can be exploited to generate FIBSEM-based large volume tomography data. This new approach requires less user interaction, yields a proven high milling success rate and maintains outstanding contextual information over the course of the whole experiment.
This talk will introduce the most recent ZEISS cryo CLEM solution and presents the latest results based on this technique.

[1] T. Zachs, J. M. Medeiros, A. Schertel, G. L. Weiss, J. Hugener, M. Pilhofer, " Fully automated, sequential focused ion beam milling for cryo-electron tomography", bioRxiv, (2019).