



Cryo-electron Microscopy and Tomography

What we do

Main focus of our core facility (CF) is determination of high-resolution structures of protein and protein – RNA/DNA complexes using transmission electron microscopy of vitrified samples under cryo-conditions (cryoTEM). Vitrification preserves protein complexes in frozen fully-hydrated state which affords high-resolution structural characterization of biomolecules at near-native conditions. Besides structure determination of purified complexes in vitro, our laboratory also focuses on preparation of thin cellular section of vitrified cells for in situ structural studies of protein complexes using cryo-electron tomography (cryoET).

We have found a mutual interest with Electron microscopy facility at VBCF Vienna which is equipped with high-pressure freezing device in the project which focuses on in situ characterization of proteins inside large cells. High pressure freezing (VBCF) allows vitrification of large cells are not vitrified by standard plunge freezing. Focus ion beam micromachining by FIB/SEM microscope (CEITEC MU) is then used to prepare thin cellular sections which can be studied by cryoET to structural characterize proteins and their complexes in the context of the cell.

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FEI Titan Krios microscope: High-end transmission electron microscope for cryo-electron microscopy equipped with direct electron detector camera Falcon2.



FEI Vitrobot Mark IV: Vitrification device for sample preparation for cryo-electron microscopy



FEI Versa 3D FIB/SEM microscope. Small dual-beam microscope for preparation of thin cellular sections from vitrified material equipped with cryo-stage and device for sample transfer under cryo-conditions.

Services and Methodologies Provided

- high-resolution cryoTEM imaging (single particle analysis, cryo-electron tomography)
- single particle and cryo-electron microscopy data analysis
- focused ion beam micromachining under the cryo-conditions
- preparation and vitrification of cellular and protein samples by plunge freezing

Equipment

- cryoTEM – FEI Titan Krios
- cryoTEM – FEI Tecnai F20
- small dual-beam instrument – FEI Versa 3D

Contact and Location

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