

# The cryo-electron microscopy facility at the National Institute of Chemistry

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The field of cryo-electron microscopy (cryo-EM) has seen rapid development and significant technical improvements in the last decade. Perhaps most important have been the advances in sample preparation, direct electron detectors and data analysis for which the Nobel Prize in Chemistry was awarded in 2017. Cryo-EM has become an important tool for gaining structural insights into cells, organelles, biomolecular complexes, proteins, peptides and small crystalline molecules. In addition to biological samples, cryo-EM can also be a successful tool for structural analysis of some radiation-sensitive organic and inorganic samples, as well as various industrial samples, especially from the pharmaceutical and food industries. At atomic or near-atomic resolution, cryo-EM offers a unique combination of features.

The cryo-EM facility at the National Institute of Chemistry was established in 2019 and remains the only one in the wider south-eastern EU region. It houses the 200 kV Glacios cryo-transmission electron microscope, which can perform single particle analysis (SPA), tomography (cryo-ET) and microcrystal electron diffraction (MicroED) experiments.

Researchers can test and screen various samples (isolated proteins, (synthetic) protein complexes, biological and synthetic membranes, viruses and virus-like particles, nanoparticles, etc.) and perform sample optimization for final data collection, which can be performed either at this microscope or at other cryo-EM facilities. Samples are vitrified by plunge-freezing (Vitrobot), and the Falcon 3 detector enables acquisition of high-quality data. High performance computing (HPC) infrastructure is available for data storage and analysis.

The cryo-EM facility is part of the Centre for Molecular Interactions and Structural Biology (CMISB) within the Department of Molecular Biology and Nanobiotechnology and is open to internal and external users from academia and industry. The facility can be contacted via email [cryoem@ki.si](mailto:cryoem@ki.si).

See the attached picture: Three main cryo-EM modalities available at the NIC. Single Particle Analysis - SPA (a), cryo electron tomography - cryo-ET (b), Microcrystal electron diffraction - MicroED (c).

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