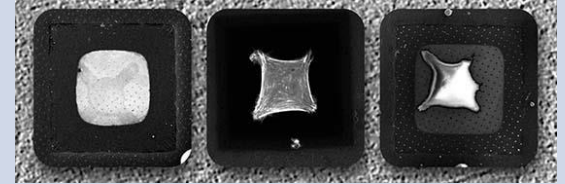


Functionalized cryo-EM grids for in-cell studies

Cryo electron microscopy (cryo-EM) currently plays a prominent role in macromolecular structure determination. In parallel, cryo-electron tomography (cryo-ET) it is also an important technique for studying the cell interior.

The specimen preparation for cellular cryo-ET requires thinning of the cells by cryo-focused ion beam (cryo-FIB). To perform cryoFIB, cells are seeded on EM grids. However, only cells positioned in the centre of a grid square can be used for cryoFIB. This process is currently uncontrolled, which leads to inefficient sample preparation since many cells are not positioned correctly.

Scientists at the EMBL Heidelberg have developed a technology to functionalize the grids using photomicro patterning with a laser, allowing to control the position of cells on the grids with a high degree of spatial accuracy. The technology works on grids of different materials, and patterned grids can be stored up to 30 days under hydrated conditions at 4°C.



Cryo-electron tomography of an RPE1 cell (background image) uncovers branching actin filaments and hexameric densities related to cell adhesion. The insets show a cell grown on a cross-shaped micropattern. PHOTO Mauricio Toro-Nahuelpan/EMBL

- The technology was developed for optimizing cell positioning on gold and titanium cryoEM grids and to create complex patterns to control cell shapes for cellular studies.
- The technology enables and can be used in the development for high-throughput cryo-FIB applications which are lacking today.
- The control of cell shape by complex patterns achieved with photomicropatterning could be the basis for novel cellular testing systems.
- The technology could be expanded to more grid materials, other than gold and titanium.

- A patent application has been filed in 2019
- Further information can be found in the publication relating to the technology and in the press release:
- <https://www.nature.com/articles/s41592-019-0630-5>
- <https://embl-em.de/press-releases/2019/11/25/photo-micropatterning-advances-structural-cell-biology/>

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