

# Photo-Micropatterning - Creating functionalized cryoEM grids for studying cell architecture

EMBLEM Ref. 2019-027

## Challenge

- Cryo-Electron Microscopy is one of the major imaging technologies for structural biology
- Sample preparation of intact cells for cryo-ET by cryo-FIB relies on the proper positioning of cells on the cryo-EM grids
- Spatial distribution of cells on the grids with traditional methods is subject to coincidence, resulting in many samples not suitable for cryo-FIB

## Commercial Opportunity

- EMBL offers a Technology Evaluation Programme, as well as licensing and collaboration opportunities

## Technology

- Allows to study the intracellular architecture in their native, functional cellular environments, by enabling to control cell shape and differentiation in a predictable manner
- Photo-micropatterning of cryo-EM grids allows for spatially controlled adhesion of cells
- The technology can be employed on a variety of grid materials
- The functionalization of micropatterns generate predictable cellular organization and therefore allow for the direct correlation between cell architecture and in-cell three-dimensional structural characterization
- The technology can be employed on a variety of grid materials
- compared, to traditional sample preparation this allows for high-throughput generation of specimen with cryo-FIB

## Contact

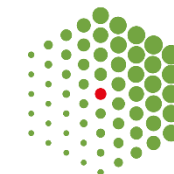
Dr. Jürgen Bauer, [bauer@embl-em.de](mailto:bauer@embl-em.de)

## Key Inventors

Dr. Julia Mahamid  
Group Leader  
EMBL Heidelberg

## Intellectual Property

[WO2020254627 \(A1\)](#)



**EMBLEM**  
TECHNOLOGY TRANSFER

# Photo-Micropatterning - Creating functionalized cryoEM grids for studying cell architecture

EMBLEM Ref. 2019-027

The method comprises several steps:

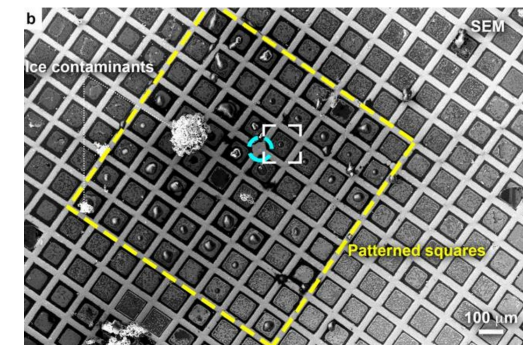
1. Passivation: Grid passivation with anti-fouling agent PLL-g-PEG generates an organized repulsive PEG brush at the surface
2. Photo-Micropatterning using a laser
3. Spatially constrained ablation of the PLL-g-PEG passivation layer
4. Grid functionalization with extracellular matrix (ECM)-related proteins
5. Cell seeding at the functionalized micropatterned areas
6. Storage up to 30 days under hydrated conditions at 4°C

Grid materials suitable for Photo-Micropatterning:

- Gold or titanium mesh
- SiO<sub>2</sub> films
- full gold grids
- continuous amorphous carbon or graphene film

## References

Toro-Nahuelpan, M., Zagoriy, I., Senger, F. et al. Tailoring cryo-electron microscopy grids by photo-micropatterning for in-cell structural studies. *Nat Methods* **17**, 50–54 (2020). <https://doi.org/10.1038/s41592-019-0630-5>



### Internal Reference

2019-027

### Key Inventors

Dr. Julia Mahamid  
Group Leader  
EMBL Heidelberg

### EMBLEM TECHNOLOGY TRANSFER GMBH

Boxbergring 107  
D-69126 Heidelberg  
Germany  
Tel.: +49 (0) 6221 363 22 10

[info@embl-em.de](mailto:info@embl-em.de)

[www.embl-em.de](http://www.embl-em.de)