

1 PhD position, starting January 2023

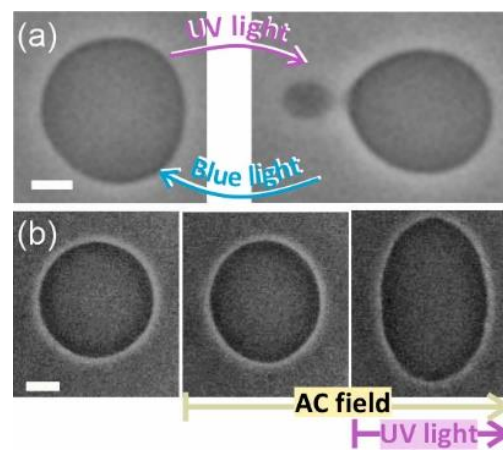
65% TVöD E13 (3 years)

on **Gauging membrane tension and channel activity with light**

within the Cluster of Excellence [UniSysCat](#) in the Berlin/Potsdam area

Project description – the job

In this project, we will establish an artificial cell-mimetic system, in which membrane tension is modulated by light using photo-responsive lipids and vectorial transport across the membrane is triggered by photo-induced tension ramp. As a workbench, we will employ micron-sized membrane compartments, namely giant unilamellar vesicles (see figure), in which the mechano-sensitive channel of large conductance (MscL) will be reconstituted. The vesicle membrane will contain photoswitchable lipid the isomerization of which will modulate the membrane tension. Using biophysical approaches based on micropipette aspiration, vesicle electrodeformation, optical microscopy, as well as microfluidics, we will precisely measure the imposed tension needed to gauge the opening of the channel. The established methodology will be applied using both bottom-up and top-down pathways for the preparations of the membrane compartments, namely using giant vesicle swelling from a few lipids (bottom-up) and deriving vesicles from the plasma membrane of cells whereby preserving the molecular protein-lipid variety (top-down). The established methodologies will be introduced to explore the performance of the mechanosensitive channel TRAAK as well.



(a) Tension and area of a giant vesicle doped with photoswitches is modulated by UV-blue light irradiation. (b) The membrane area change can be gauged by externally applied AC field [[Georgiev et al. Adv. Sci. 5, 1800432, 2018](#)]. Scale bars: 10 μm .

Research environment – the group

The PhD student will join the team of [Dr. Rumiana Dimova](#). Dr. Dimova is a leading expert in the field of membrane biophysics and her international group offers a highly cooperative working environment and cutting-edge experimental facilities. Collaborations with the research group of [Prof. Joachim Heberle](#) at the Free University of Berlin will be involved in the project development. The [Max Planck Institute of Colloids and Interfaces](#) in Potsdam is a world-renowned research institution that offers interdisciplinary and collaborative research environment at national and international level.

Requirements – the candidates

- MSc or equivalent degree in: (bio)physics / (bio)chemistry / (bio)engineering
- interest in: physics of biological systems
- experience with membranes & membrane proteins / microscopy / microfluidics will be an advantage
- excellent command of English & ability for independent research

Submit your application via email to [rumiana.dimova\[at\]mpikg.mpg.de](mailto:rumiana.dimova[at]mpikg.mpg.de) including:

- motivation letter: why do you apply for this position, what are your research interests, how do you fit
- detailed CV
- university grades transcripts (BSc, MSc)
- names and email addresses of 2 reference persons ready to give feedback

Your application will be reviewed as soon as it is received. The position will be filled ASAP. **Starting time: 1.1.2023**

The Max Planck Society strives to ensure a workplace that embraces diversity and provides equal opportunities irrespective of the applicants' gender, nationality or disabilities. The Max Planck Society is committed to increasing the number of individuals with disabilities in its workforce and therefore encourages applications from such qualified individuals.