香港中文大學理學院
FACULTY OF SCIENCE
THE CHINESE UNIVERSITY OF HONG KONG

School of Life Sciences 生命科學學院

LIFE SCIENCES SEMINAR SERIES 2024 – 2025

Membrane remodeling in artificial cells: to bud or not to bud

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Germany

4:00pm - 5:00pm
13 Nov, Wednsday

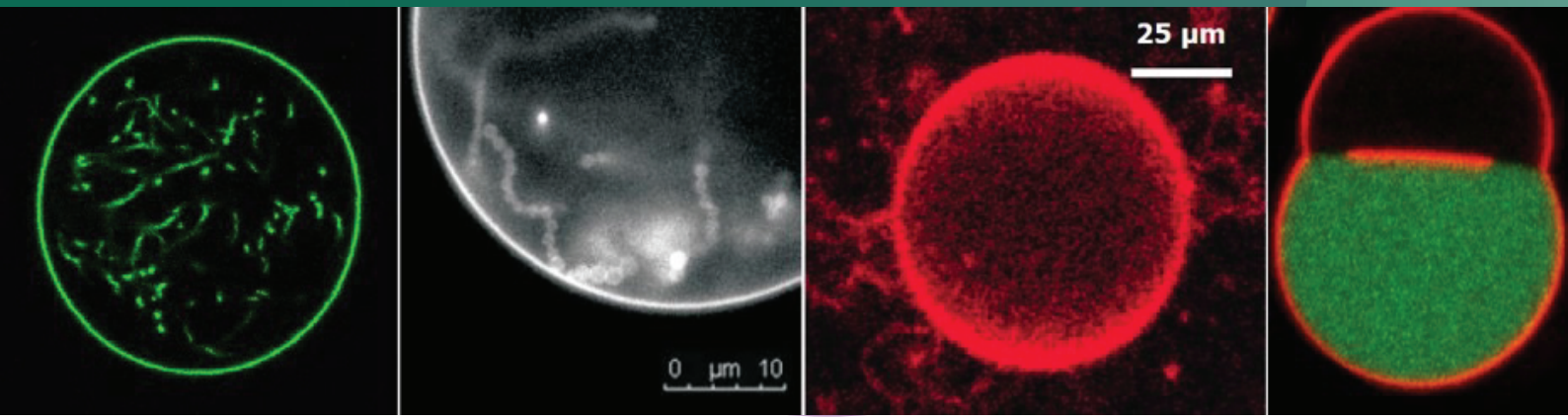
SC297
Science Centre

Brief biography

Rumiana Dimova obtained her PhD at Bordeaux University (France) at the end of 1999. She then joined the Max Planck Institute of Colloids and Interfaces (MPICI, Germany) as a postdoctoral fellow, and shortly afterwards became a group leader in 2000 leading the Biophysics Lab (www.dimova.de). Her main research interests are in the field of membrane biophysics. She has been tackling a variety of open questions in cell membrane biophysics and synthetic biology. Her group employs giant vesicles as a platform to develop new methods for the biophysical characterization of membranes and processes involving them. In 2014, R. Dimova was awarded the Emmy Noether Distinction for Women in Physics of the European Physical Society. She has acted as Scientific Representative of MPICI (2016–2019) and in 2017 was elected as the Chair of the Membrane Structure and Assembly Subgroup of the Biophysical Society. In 2021, she received the Liesegang Prize of the German Colloid Society for her work on lipid bilayers and Biomembranes and in 2023 she was awarded the Thomas E. Thompson award of the Biophysical Society for her work on membrane rigidity and tension, membrane curvature and membranes in electric fields.

Abstract

Cell membranes exhibit a large variation in curvature and the common perception is that it is driven by specific proteins. We will demonstrate that curvature can be readily generated by various membrane asymmetries, plausibly acting as factors defining membrane organelle shapes. As a workbench for artificial cells, we employ giant unilamellar vesicles (GUVs, 10–100μm). We will discuss examples for curvature generation including asymmetric distribution of ions across the membrane, insertion/desorption of the ganglioside GM1, PEG adsorption. Macromolecule adsorption at low surface coverage also stabilizes the spontaneous curvature, impacting membrane morphology and inducing vesicle fission. Finally, the process of membrane wetting by molecularly-crowded solutions and protein condensates will be shown to induce vesicle budding, membrane tubulation and restructuring. The presented examples will demonstrate that even in the absence of specific proteins and/or active processes, membranes can be easily remodeled by simple physicochemical factors.



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