On the geometry of demixing: A study of lipid phase separation on curved surfaces

Rinaldin, M.

STELLINGEN

behorende bij het proefschrift

ON THE GEOMETRY OF DEMIXING

A study of lipid phase separation on curved surfaces

I. Fluorescence recovery after photobleaching measurements indicate that silica is the most suitable material for lipid functionalization on colloidal particles. Single-molecule experiments could tell us why. *Chapter 2 of this thesis.*

II. Colloid supported lipid bilayers can mimic the cell membrane more appropriately than vesicles or mm-sized corrugated supported lipid bilayers because they are at the same time closed and scaffolded. *Chapter 2 and 3 of this thesis.*

III. The importance of closeness *versus* openness in two-dimensional phase separating systems has remarkable consequences on equilibrium configurations. Nevertheless, it has been so far neglected. *Chapter 5 of this thesis.*

IV. Supported lipid bilayers on three-dimensional micro-printed structures will be a valuable tool to investigate curvature-induced protein sorting. *Chapter 6 of this thesis.*

V. The coexistence of multiple sub-micrometer lipid domains observed by Madwar *et al.* is due to the small fraction of mobile lipids which results in non-equilibrium configurations.
C. Madwar, G. Gopalakrishnan, and R. B. Lennox, Langmuir ***31****, 4704–4712 (2005).*

VI. When analysing their data, Parthasarathy *et al.* and Subramaniam *et al.* have considered their experimental system as a supported lipid bilayer, while it should have been described as a deformed vesicle.
R. Parthasarathy, C. Yu, and J. T. Groves, Langmuir **22,** *5095–5099 (2006).*
A. B. Subramaniam, S. Lecuyer, S. K. S. Ramamurthi, R. Losick, and H. A. Stone, Adv. Mater. ***22,*** *2142–2147 (2010).*

VII. It is surprising that Subramaniam *et al.* do not measure an increase of the fluorescence recovery after photobleaching diffusion coefficient on half-spherical membranes with respect to flat membranes.
A. B. Subramaniam, S. Lecuyer, S. K. S. Ramamurthi, R. Losick, and H. A. Stone, Adv. Mater. ***22,*** *2142–2147 (2010).*

VIII. The knowledge on liquid-liquid phase separation gained in the last fifty years by studying lipid membranes should be applied to the novel discoveries on the assembly of membrane-less organelles by phase separation in living cells.
Y. Shin and C. P. Brangwynne, Science ***357****, 1253 (2017).*

IX. Teaching children the Kantian ethics of the Universal Law of Nature at school and home could be a powerful measure against climate change.