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

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Citation

Rinaldin, M. (2019, November 7). *On the geometry of demixing: A study of lipid phase separation on curved surfaces*. *Casimir PhD Series*. Retrieved from <https://hdl.handle.net/1887/80202>

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Issue Date: 2019-11-07

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.