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DMPC model membrane structure and dynamics in the presence of the saponin aescin

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Vesicle shape and bilayer parameters of 1,2-dimyristoyl-sn-glycero-3-phosphocholine based vesicles are studied by small-angle X-ray (SAXS) and small-angle neutron (SANS) scattering in the presence of the natural surfactant (saponin) aescin [1]. We confirm successful incorporation of aescin molecules by analysis of the radii of gyration of the vesicles which we use as model systems. Furthermore, we study the impact of aescin incorporation on bilayer thickness parameters from the neutron and X-ray perspective. Additionally, the bending elasticity of these vesicle bilayers is studied in the presence of aescin.
Neutron spin-echo spectroscopy (NSE) allows to detect subtle changes in the dynamics and mechanics of lipid membranes. Changes of the bending elasticity are detectable at temperatures below and above the main phase transition temperature of the lipid. The impact of aescin is much more significant below . It has been found that below the phase transition temperature the addition of aescin to the vesicles softens the bilayer. Above the phase transition temperature the value of
bending elastic constant increases with increasing aescin content and the bilayer becomes more rigid. Altogether, we demonstrate by analysis of the structure and dynamics of the vesicles that the impact of aescin strongly depends on the lipid state [2].
[1]Sreij, R., Dargel, C., Moleiro, L., Monroy, F., & Hellweg, T.; Langmuir (2017), 33 (43), 12351-12361.
[2] Sreij, R., Dargel, C., Geisler, P., Hertle, Y., Radulescu, A., Pasini, S., Perez, J., Moleiro, L. H. & Hellweg, T., Physical Chemistry Chemical Physics (2018), 20, 9070-9083

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