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Influence of the size of interacting domains on the diffusion of nano-particles FLORIAN RÜCKERL, CARSTEN SELLE, JOSEF KÄS — Single particle tracking (SPT) is widely used for investigating the diffusion of proteins in cell membranes. However, short lifetime and the blinking of fluorescent tracers make it difficult to obtain sufficient data on the interactions with the inhomogeneities of the membrane. Langmuir lipid monolayers provide control over obstacle size and the corresponding interaction energy since their condensed domains within liquid phases exhibit a net dipole moment. The diffusion of a stable, negatively charged latex bead in the coexisting liquid phase, with a dipole moment anti parallel to the one of the domain, was observed by SPT. The interaction energy was obtained by Boltzmann statistics of the tracking data. The electric field of the monolayer domains varies with domain size. Its distance dependence can principally change from $E \sim 1/r^3$ for a single dipole to $E \sim 1/r$ for large domains ($R > 10m$). The influence of this change on the particle diffusion was investigated by Monte Carlo simulations. The analysis shows that the particles are stronger trapped at the domain border of smaller domains and that a change from two to one dimensional diffusion occurs. Recently, we also started analogous experiments using red blood cells and vesicles as biomembrane mimics.

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