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Influence of straight medium chain alcohols on the dynamics of phospholipid model membranes

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An important part of biological plasma cell membranes is the lipid bilayer, functioning as a two-dimensional matrix, separating different cell spaces and serving as an anchorage for e.g. proteins. Incorporation of foreign amphiphilic molecules such as a series of 1-alcohols into the cell membrane changes membrane properties such as bilayer thickness, lipid packing and lateral pressure profile. We have used QENS in the 300 ps time range by time of flight spectroscopy at TOFTOF and in the 1 ns time range by backscattering spectroscopy at SPHERES in order to investigate the effects of alcohols on the local dynamics of multilamellar (MLV) and unilamellar vesicles (ULV) in excess of water. In the 300ps time range the dynamics is slower for undoped multilamellar than for undoped unilamellar vesicles, i.e. interlamellar forces seem to play a role for the membrane lipid diffusion. The dynamics of multilamellar vesicles is getting faster when adding hexanol. In the 1 ns regime MLV show similar effects but not as conclusive as at a time scale of 300ps. The results of these experiments will be presented and discussed.

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