

IN SITU PHOSPHOLIPASE A₂ DEGRADATION OF ONE- AND TWO-COMPONENT PHOSPHOLIPID BILAYERS IMAGED BY ATOMIC FORCE MICROSCOPY

Thomas Kaasgaard, John Hjort Ipsen, Ole G. Mouritsen, Kent Jorgensen: technical university of denmark, Dept. of Chemistry, Build 206, Lyngby, 2800 Denmark

The in situ phospholipase A₂ (PLA₂) catalyzed degradation of solid supported DPPC and DMPC-DSPC phospholipid bilayers has been monitored using atomic force microscopy (AFM). The mica supported phospholipid bilayers were prepared by two vertical monolayer depositions using Langmuir-Blodgett techniques. The in situ enzymatic degradation of the gel phase lipid bilayers was investigated at room temperature after PLA₂ injection. It is observed that the PLA₂ hydrolysis activity varies almost linearly as a function of time elapsed after addition of PLA₂ to the DPPC bilayer. For the equimolar DMPC-DSPC mixture an increased PLA₂ activity is observed towards small-scale DMPC enriched domains. The AFM results clearly visualize that an intimate relationship exists between PLA₂ phospholipid hydrolysis and lipid bilayer microstructure, e.g. lipid domain boundaries and lipid bilayer regions of high local curvature. This is in accordance with earlier results showing a fast enzymatic hydrolysis of highly curved vesicles and lipid bilayers undergoing phase transitions.