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Ca^{2+} induced changes in PIP_2 containing membranes at physiological concentrations MARTIN FORSTNER, ADOLPHE BADIAMBILE, Department of Physics, Syracuse University, IAN MCCABE, Department of Biomedical and Chemical Engineering, Syracuse University — Phosphoinositides (PIPs) play a crucial role in many cellular processes such as calcium release, exocytosis or endocytosis. In order to specifically regulate these functions PIPs must segregate in pools at the plasma membrane. A possible mechanism that could induce and regulate such organization of phosphoinositides is their interaction with bivalent cations. Using Langmuir monolayers, we investigated the effect of calcium and magnesium on the surface pressure-area/lipid isotherm of monolayer of phosphatidylinositol, phosphatidylinositol bisphosphate, dioleoylphosphatidylglycerol and palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine. The observed decrease of area per lipid, i.e. the increase in aggregation, is mostly dependent on the lipid's head group charge but ion specific. In addition, we discuss changes in free energy and compressibility of these monolayer-ion systems. Furthermore, a series of experiments were conducted on supported lipid bilayers containing physiological quantities of PIP_2. Fluorescence correlation spectroscopy was used to study the response of the PIP_2 to changes $[Ca^{2+}]$. As Ca^{2+} concentration increases, the FCS indicates that PIP_2 goes from a freely diffusing single species to a multiple species system. The diffusion rates of the additional species decrease with increasing $[Ca^{2+}]$, thus indicating increasing aggregate sizes with increasing, but physiological relevant Ca^{2+} concentrations.

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