depending on how the balance of attractive and repulsive force is shifted by the nature of the aqueous solution. We performed small angle x-ray scattering measurements to reveal how the buffers modify lipid interactions. Buffers loosely associate with the lipid membrane and alter their surface charge causing the MLVs to swell. Interestingly, as opposed to monovalent salts which charge up the PC membranes negatively, MOPS charges PC membranes positively. We have used small angle x-ray scattering to measure the modification of membrane forces and we have measured the diffusion of lipid aggregates in electric fields to determine the charging effect of the buffers on PC membranes. By measuring how buffers modify the electrical state of lipid membranes we can better understand how buffers behave at the interface of biological membranes.
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1431-Pos
Molecules Pushing Molecules: Dynamic Consequences of Crowding
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Membrane pores, such as alpha-hemolysin, sieve molecules to provide passage. Large polymers are excluded while monomers and small polymers can pass. At high concentrations, flexible polymers lose their size that exists under dilute conditions. Rather, flexible polymers look more like strings with regions of limited coherence. This transition is clear from the shift in osmotic pressure vs. polymer concentration: van't Hoff regime in the dilute limit but des Cloizeaux regime at higher concentrations. Under crowded conditions, a polymer previously unable to enter the alpha-hemolysin pore suddenly enters when the apparent limiting size is in the region of limited coherence. Mixtures of small and large polyethylene glycols show exclusion in this range where the larger species exert stress that drives the smaller polymers into and across pores at concentrations far larger than those in the bathing solution. This coupling of polymer activities and consequent conferred mobility creates a new form of crowding-driven transport.

1432-Pos
Effect pf PAH Concentration on Sops Liposomes
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We have prepared SOPS liposomes using the hydration technique. Optical microscopy experiments show that the size and shape of the liposomes do not change when they are swell with a glucose/sucrose solution. To the SOPS liposome system we add the polyelectrolyte PAH (Poly-Allylamine Hydrochloride), producing a drastic change in the liposome structure. We have studied the influence of PAH on the liposome shape and size distribution by means of Differential interference contrast microscopy (DIC). The results show that PAH interacts with the SOPS liposomes forming PAH-SOPS complexes.

1433-Pos
Localized Photothermal Heating of Temperature Sensitive Liposomes
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A drug delivery system consisting of a temperature sensitive liposome coupled to hollow gold nanoshells allows precise spatial and temporal control of drug release. A small fraction of lysolipid in a primarily dipalmitoylphosphatidylcholine (DPPC) liposome lowers the membrane transition temperature to that obtainable by mild hyperthermia, while simultaneously enhancing the membrane permeability at the transition temperature. Hollow gold nanoshells coupled to the liposomes heat the membrane when irradiated by a continuous wave near-infrared laser. The heat generated by the nanoshells can be tuned to control local membrane temperature, and hence the membrane permeability and rate of drug release. This system could be used to deliver anticancer drugs directly to a tumor site. Additionally, the ability to correlate drug release with membrane temperature allows us to empirically determine the local heat generated by the hollow gold nanoshells upon laser irradiation.

1434-Pos
Phase Diagram of a 3-Component Lipid Mixture Containing a Polyunsaturated Phosphatidylcholine
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Polyunsaturated acyl chains have special influences on the mixing and phase behaviors of lipid mixtures. Their high degree of unsaturation affects the physical properties of biomembranes in ways that are still not fully understood, and their high concentration in some membranes makes them key players in membrane structure. We are investigating the 3-component phase diagram for the biologically relevant mixture of brain-SM/ 18:0-22:6 PC/ cholesterol. Fluorescence microscopy imaging of giant unilamellar vesicles (GUVs) was employed for phase boundary visualization and phase identification of the 3-component mixture. Fluorescent lipid probes having complementary partitioning behavior are used in FRET measurements to enable more quantitative analysis. Of particular interest is the region of Lo + Lα phase coexistence, which shows macroscopic phase separation.

1435-Pos
Investing Early Signaling Events in IgE-FcεRI Activation Using SEM
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Antigen-mediated cross-linking of immunoglobulin E (IgE) bound to its high affinity receptor FcεRI on mast cells initiates a transmembrane signaling cascade that results in cell activation and exocytotic release of chemical mediators involved in allergic response. Plasma membrane lipids and proteins redistribute as part of this transmembrane signaling process. To understand the functional role of these redistributions, resolution of their size, composition and structure on the nanometer scale is required. We utilize high resolution scanning electron microscopy (SEM) to directly visualize sub-micron membrane domains in intact cell membranes. In our experiments, the distribution of gold-labeled proteins and lipids is analyzed at the surface of intact fixed cells using backscattered electron detection. In parallel, we also observe membrane topography using secondary electron detection. We use a pair-correlation function analysis to quantify protein distributions and parameterized domain size. We have mapped the distribution of a variety of proteins, both related and non-related to the IgE signaling pathway. Using this experimental and quantitative method, we observe dramatic changes in the nano-scale membrane distribution of IgE due to stimulation with multivalent ligands. In resting cells, IgE receptors are clustered into small domains less than 30nm. After stimulation, receptors redistribute into large domains that are correlated at long length-scales and subsequently reduce in size at long stimulation times. We also observe cross-linking-dependent rearrangement of several inner leaflet-associated proteins implicated in early signaling events. In contrast, outer leaflet GPI-anchored proteins are not affected. We have also quantified the co-redistribution of IgE with other membrane proteins after stimulation using cross-correlation functions. These findings provide valuable insights into the mechanisms that drive the selective nanoscopic reorganization of plasma membrane proteins during immune cell signaling.

1436-Pos
Fluorescence Measurements in Fruit Fly (Drosophila Melanogaster)
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Drosophila melanogaster is a widely used animal model in developmental biology. In *Drosophila*, the wealth of genetic tools allows expression of any given marker or construct in specific cells or tissues within the organism. This is especially advantageous since particular cells can be studied in their natural 3D organization, avoiding possible artefacts and deviations from the physiologically relevant situation that may be introduced in cell cultures. For the study of molecular dynamics within cells and cell membranes on a single molecule level, we performed fluorescence correlation spectroscopy (FCS) within the *Drosophila* embryonic nervous system. Using a GAL4 driver expressed in a small subset of neurons, we expressed fluorescently tagged fusion membrane proteins, CD8 and flotillins-2, in two identified motor neurons per hemisegment of the embryonic central nervous system (CNS). We obtained autocorrelation curves for membrane and cytoplasmic probes which show diffusion times that correspond to their respective subcellular locations. By additionally expressing (non-tagged) proteins which influence lipid metabolism, example ceramidase, we are able to follow changes in the molecular dynamics of membrane proteins. With this approach, we are studying the biophysical properties of the cellular membrane *in vivo* and *in situ* and will extend this in the future to different genetic backgrounds. The study shows that *in vivo* analyses provide us greater insights into the role of membrane dynamics in the context of development, differentiation and pathogenesis of diverse diseases.

1437-Pos
The Influences of Electric Fields on Lipid Membranes
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