3P211 皮膚角層モデル膜に対する水の浸透の FTIR-ATR による解析
FTIR-ATR analysis of water permeation into stratum corneum model membranes

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We examined permeation of D2O through SC model membranes by FTIR-ATR. The model membranes were composed of only one kind of ceramide, cholesterol and free fatty acid with hydrocarbon chain length of 16–24. The lipid mixture in chloroform/methanol was directly sprayed onto the ATR prism to form a homogeneous film. After removal of the solvent, a drop of D2O was mounted on the film. An increasing signal around 2500 cm^{-1} appears as the D2O molecules reach into the region where their FTIR signal is detectable. The time course analysis of the FTIR signal revealed that the longer is the hydrocarbon chain length, the lower is the permeation rate. Based on the results, we'll discuss the relationship between the molecular packing in the membrane and the water permeability.

3P212 時分割広角 X 線散乱によるラフトモデルリポソームとアミロイドベータタンパク質との相互作用に関する研究
Time-resolved wide-angle X-ray scattering study of interaction between raft-model liposome and amyloid-beta protein

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Recently, the significance of studies of proteins and membranes in cell environment has been pointed out. On the other hand, in-vitro spectroscopic studies of amyloid-beta (Ab) proteins have been done in dilute solutions in many cases. Therefore, the mechanism of amyloid formation under crowding environment still remains controversial and ambiguous.

By using time-resolved wide-angle X-ray scattering (WAXS), we have studied the effect of the interaction with Ab protein on the structure of raft-model membrane liposomes (ternary mixture: glycosphingolipid / cholesterol / phospholipid) under macromolecular crowding environment. The time-course of WAXS data suggests that the presence of Ab tends to induce multi-lamellar formation under crowding.

3P213 力学的負荷下でのコレステロール含有リン脂質膜中の疎水孔形成：分子動力学シミュレーション
Hydrophobic Pore Formation in Phospholipid/Cholesterol Bilayers under Mechanical Stretching: Molecular Dynamics Simulation

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Pore structure penetrating lipid bilayers plays an important role in membrane permeabilization under mechanical stretching. We perform molecular dynamics simulations of stretched DPPC/Cholesterol bilayers, expressed by applying various constant areal strains. When the areal strain exceeds a critical value, a hydrophobic pore (HoP) forms in the DPPC/Cholesterol bilayer, unlike the hydrophilic pore (HiP), whose edge is lined with hydrophilic headgroups of lipids, in pure bilayers. Furthermore, we analyzed the free energy difference between HoP and HiP in the DPPC/Cholesterol bilayer and found that the energy for HoP is lower than that for HiP, which rationalize the formation HoP in the DPPC/Cholesterol bilayers under mechanical stretching.

3P214 細胞運動における細胞内局所 pH の影響
Effect of cytoplasmic local pH on the cell migration

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Intracellular pH plays important roles in signal transduction in the cellular slime mould *Dictyostelium discoideum*, which is a model organism for studies on cell motility, chemotaxis and differentiation. Chemotactic stimulation by cAMP was reported to elicit an efflux of protons and increase the speed of moving cells. However it remains unknown how the intracellular pH change is transduced in moving cells. To investigate the transduction mechanism of intracellular pH, we constructed *Dictyostelium* strains expressing pH-sensitive fluorescent proteins and then observed cytoplasmic local pH changes and cell dynamics simultaneously by fluorescence microscopy. We will discuss the role of cytoplasmic local pH in signal transduction.

3P215 協働的自己会合に基づく脂質—ペプチドナノ微粒子の自己複製
Self-reproduction of lipid-peptide nanoparticles by synergistic self-assembly

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Self-replication is one of the fundamental functions of living organism. We describe a self-reproduction of lipid-peptide nanoparticles (nanodiscs) formed by chemical ligation of precursors and self-assembly of the building-blocks. The ligation reaction was accelerated on lipid bilayer surfaces and the products spontaneously assembled into the nanoparticles with lipid molecules. When the nanodiscs were formed, a rapid proliferation occurred not by a template- or complex-enhanced ligation of precursors but by the spatial rearrangements of the molecules between the pre-existed nanodiscs and the unreacted materials. Our study suggests that the synergistic self-assembly possibly underlie the principles of heterogeneous multimolecular self-replicating systems.

3P216 走査型イオンコンダクタンス顕微鏡を用いたコンフルエント上皮生細胞の膜揺らぎ定量化
Membrane fluctuations of confluent epithelial cells quantified by scanning ion conductance microscopy

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Membrane of cells fluctuates thermally and actively owing to the intracellular dynamics and external cell-to-cell interactions. Recent our study [1] using scanning ion conductance microscopy (SICM) revealed that membrane fluctuations of adherent cells exhibited a spatial dependence, but the origin of the spatial dependence is still unknown. To elucidate the mechanism of the fluctuation, we used a modified SICM to map membrane fluctuations of cells. It is found that spatial distribution of cell membrane fluctuations significantly varies among cells. We will show in detail how the membrane fluctuations are affected by the dynamic behaviors of underlying cytoskeleton and discuss the mechanism.

[1] Mizutani et al. Appl. Phys. Lett. 102, 173703 (2013).