

Sugihara LAB.

[Understand Biological Membrane Functions]



Institute of Industrial Science

Department of Materials and Environmental Science

Biophysical Engineering

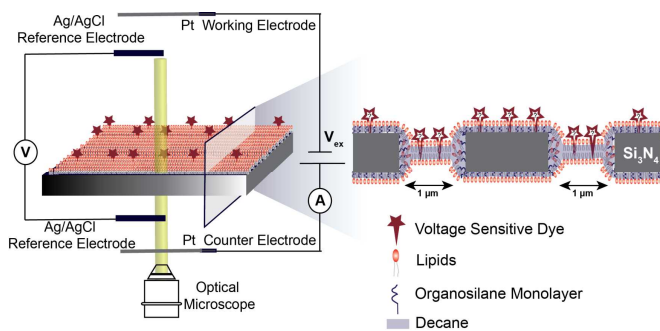
Chemical System Engineering : Graduate School of Engineering

<https://sugiharalab.iis.u-tokyo.ac.jp/>

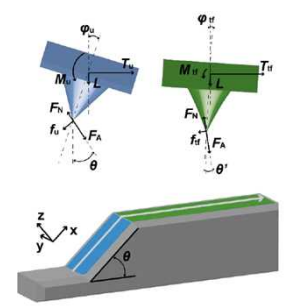
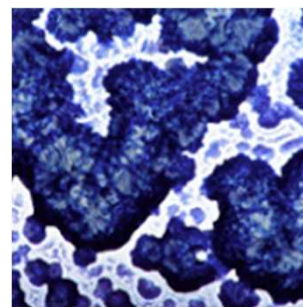
How do we process the information that comes from outside of our bodies?

Stimuli that come from outside of our bodies such as light, sound, and pathogens are processed at biological membranes (cell membranes) into chemical or electrical signals by membrane proteins and peptides. Therefore, biological membranes are the information trafficking hub for five senses, immunity and brain functions. Our lab is developing various tools to study these membrane functions. In a long term, based on these tools we want to understand fundamental biological questions such as how our body fights against bacteria and contribute to the drug development.

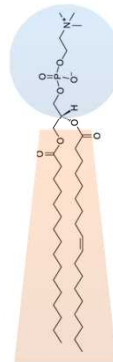
Electrical circuit of human bodies



Mechanobiology of membranes

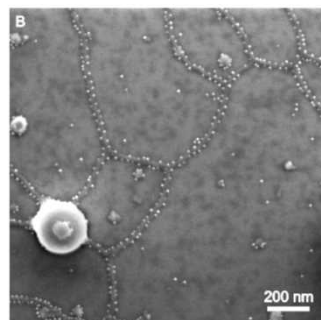
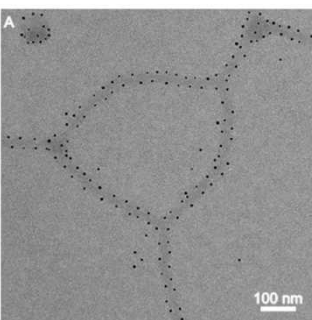
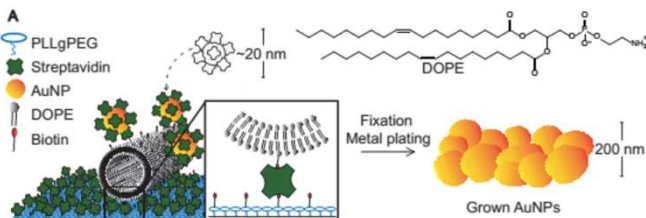


Ion channel, antimicrobial peptide, and ionophore control the stream of ions and design the electrical circuit of human bodies. We are developing electrophysiological tools to study these movement of ions.

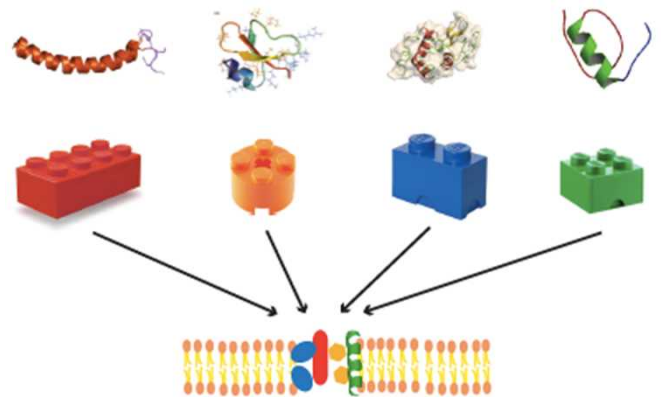


What is the mechanics of biomolecules inside membranes? To answer this question, we study the interaction between membranes and proteins by combining atomic force microscopy and mechanochromic polymers.

Nanostructures made by lipid self-assembly



Antimicrobial peptide cooperativity



Antimicrobial peptides that generate a superpower by mixing have a potential for the next generation antibiotics.