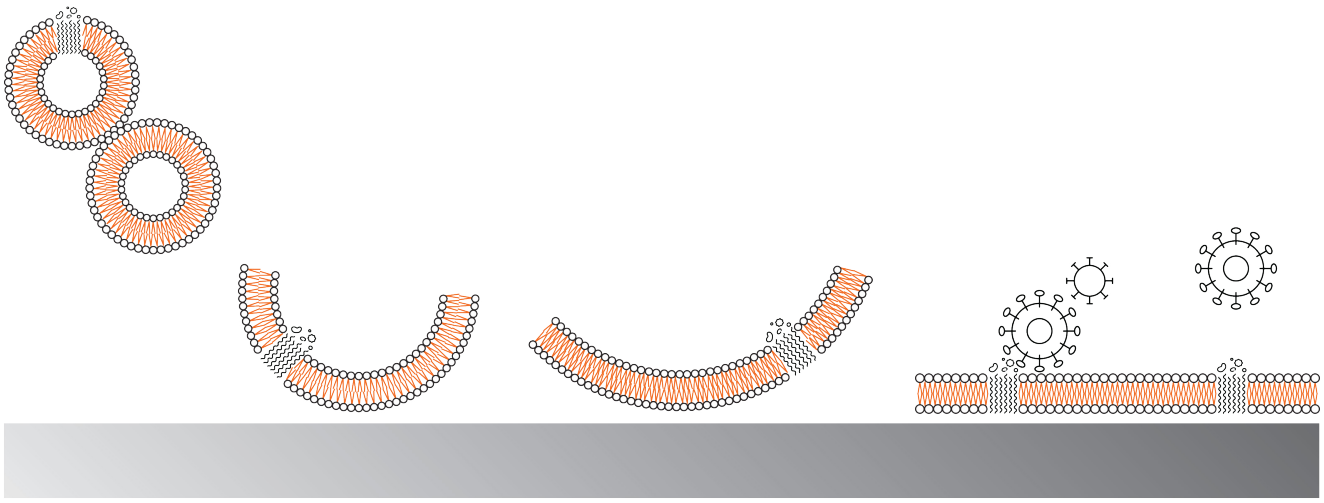
BioNavis

INTERACTIONS, AFFINITY AND KINETICS ON RELIABLE LIPID SURFACES

See lipid layer formation in real-time and label-free



SiO_2

Easy lipid membrane formation - SiO_2

MP-SPR instruments full spectrum measurement combined with multiple wavelengths allows for a variety of substrate coatings to be used. This in turn allows versatile methods to be used for deposition of phospolipid membranes for MP-SPR studies. The most typical ones are liposomes on hydrogels and supported lipid bilayers on SiO_2.

MP-SPR sensors can be often re-used even after working with lipids. Protocols are available in Bio-Navis user intranet.

KEY QUESTIONS MP-SPR CAN ANSWER IN BIOPHYSICS RESEARCH:

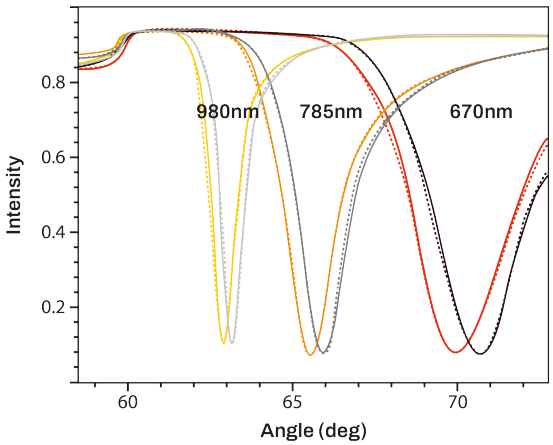
- What is the nanoparticle size?
- How does nanoparticle X interact with a biomembrane?
- How does a membrane protein (such as GPCR) interact with a drug?
- What is the quality (thickness and optical density) of the biomembrane?
- What conformation does a lipid form take on after deposition?

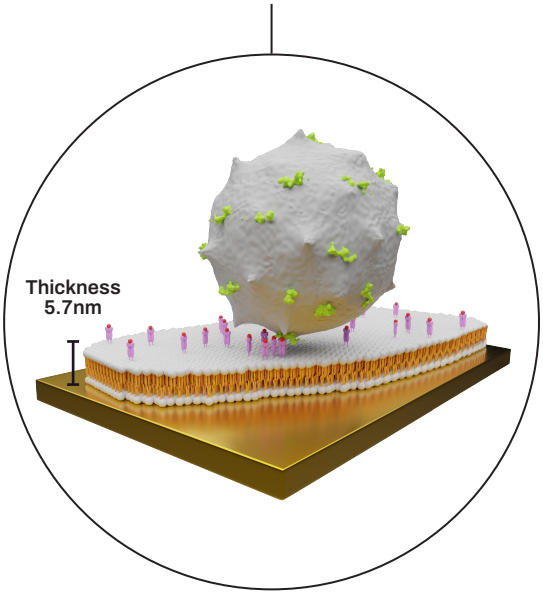
WHY CHOOSE MP-SPR FOR BIOPHYSICS?

Membrane quality

Before injecting any valuable samples, the quality of the lipid deposition can be checked and quantified. MP-SPR with LayerSolver™ software and measurements with two or more wavelengths enable true thickness and optical density measurement. This provides invaluable information about the quality of the lipid membrane and its conformation.

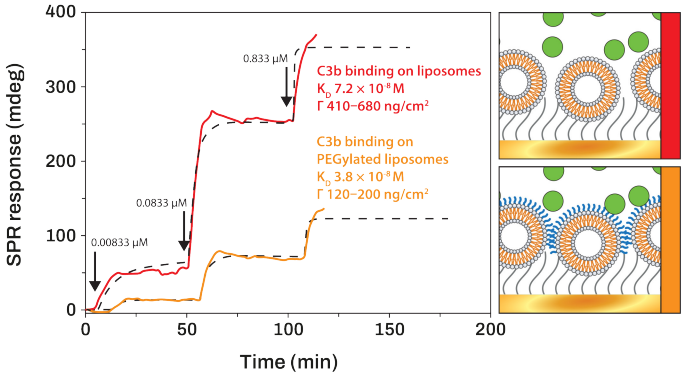
In fact, thickness and refractive index of the layer can be measured at the same time with the interaction kinetics. This in turn can show for instance lipid rupture or swelling of layers in real-time.





Binding affinity and kinetics

After you have confirmed the desired conformation of the membrane, measure binding affinity, kinetics and bound mass on target molecule or membrane. Interaction measurement are label-free and can be performed even in crude samples such as 100%.



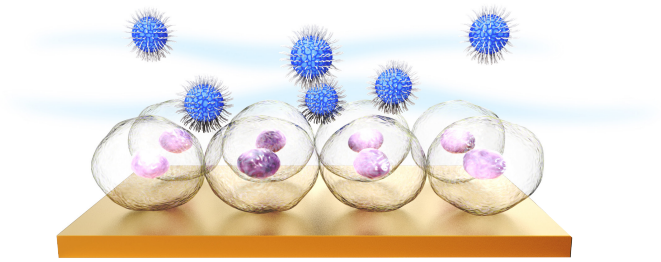
Nanoparticle size and concentration

MP-SPR instruments can also measure the size and concentration of lipid vesicles captured on the surface. The unique capability of MP-SPR to capture a complete SPR curve with multiple wavelegths of light is crucial. This methodology is suitable for measuring all sizes of extracellular vesicles (EVs), even the smallest ones.

From membranes to living cells

To maintain their functionality, some of the membrane proteins require also presence of other cellular structures. Also, certain membrane proteins, such as G-protein coupled receptors (GPCRs), are difficult to keep in functional form after retrieval from the cell. Therefore, there is a need to move to label-free measurements on whole cells.

MP-SPR has demonstrated its capabilities in conducting real-time, label-free measurements with living cells, including GPCR activation, small drug adsorption routes, and nanoparticle uptake.



Further reading

AN#170 GPCR stimulation with small drugs in live cells

AN#167 T-cell membrane receptor activity

AN#164 Extracellular vesicles binding affinity and kinetics

AN#157 Toxins interaction with lipid membranes

AN#156 Extracellular vesicles and other nanoparticles uptake by living cells

AN#152 Protein binding on liposomes

AN#151 Corona formation on liposome in 100% serum

AN#139 Self-assembly of lipid bilayer from liposomes

Selected publications

Targeting tumor-associated exosomes with peptides (Carney *et al*., Advanced Biosystems, 2017)

Proteins and 100% serum interaction with liposomes (Kari *et al*., Drug Delivery and Translational Research, 2016)

Size and concentration of extracellular vesicles (Parkkila *et al*., Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2022)

Morphology of Lipid Layers (Granqvist *et al*., Langmuir, 2014)

AL_802.a