



SEE BEYOND THE SURFACE

Multi-Parametric Surface Plasmon
Resonance – MP-SPR

www.bionavis.com



C3 PROZESS- UND
ANALYSENTECHNIK

MP-SPR APPLICATIONS

Experience MP-SPR's unparalleled capabilities that transcend traditional boundaries, enabling precise measurements across a diverse spectrum – from **small molecules** and **proteins** to **viruses**, **nanoparticles**, and **living cells**. Discover the versatility of MP-SPR whether you're delving into biophysics, advancing biosensor development, exploring biomaterials, ensuring biocompatibility, or perfecting coatings and thin films.



Nanoparticles and viruses

Measure interactions of various nanoparticles, encompassing polymers, silica, metals, liposomes, viruses, and DNA polyplexes of any size.



Biophysics

Generate supported lipid bilayers on SiO_2 sensor surfaces *in situ*. Verify membrane quality and seamlessly conduct interaction measurements for comprehensive analysis.



Living cells

Measure cell adhesion and cell-based interactions including nanoparticle uptake, drug adsorption route, GPCR activation and T-Cell interaction in physiologically relevant conditions.



Biosensor development

MP-SPR instruments offer a versatile platform for assay development. Measure directly from crude samples such as milk, serum or saliva.



Biomaterials

MP-SPR is the most sensitive label-free technique for biomaterial interaction studies and layer characterization.



Biocompatibility

Conduct a complete study of your material all the way from characterization, interaction with proteins, serum and plasma up to the interactions with bacteria and cells.



Coatings and thin films

Characterize layers with high precision, measuring down to the Ångström scale. MP-SPR instruments enable the measurement of your film in both air and liquid without the need for any adjustments to the instrument set-up.



Small molecules and Biopharmaceuticals

Measure label-free interactions in real-time revealing affinity and kinetics of the binding, whether the molecule is small molecular weight drug, antibody or protein.

SENSOR SLIDES

Select from a wide range of ready sensor slides

- ✓ Functionalized sensor slides - CMD, BND, Regenerable avidin kit, his-tagged binding (Ni^{2+}), and other options
- ✓ Oxides - SiO_2 , TiO_2 , Al_2O_3 , and other options
- ✓ Polymers - PS, PMMA, PS-PMMA, nanofibrillar cellulose (NFC) and other options
- ✓ Metals – Au, Ag and other options

Or customize your sensor using methods such as spin coating, CVD, Langmuir-Blodgett, self-assembly or other techniques of your preference.

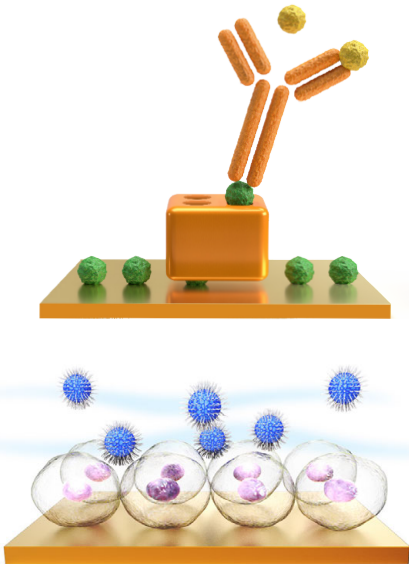


WHY CHOOSE MP-SPR?

Discover MP-SPR's unique prowess in handling diverse sample types, accommodating various measurement medias, and delivering comprehensive parameters for in-depth analysis. Elevate your research further by unlocking new insights through the seamless integration of MP-SPR with electrochemistry or fluorescence.

Advantages of MP-SPR

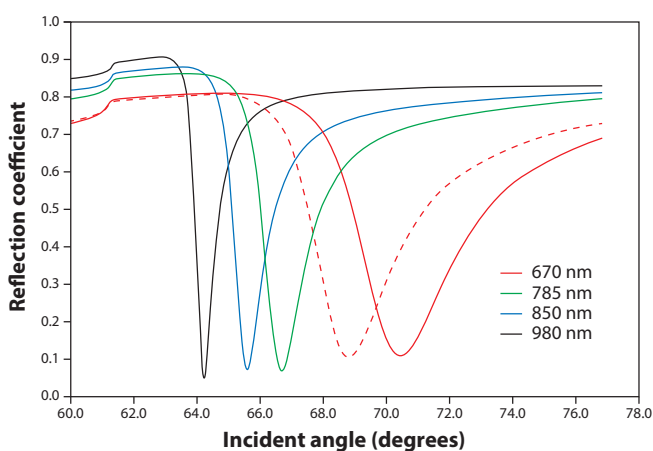
- ✓ Real-time, label-free measurements of molecular interactions, including affinity and kinetics
- ✓ Thickness characterization, from Ångströms to several micrometers
- ✓ Effective in both gas and liquid environments
- ✓ Suitable for complex targets like nanoparticles, viruses, and live cells
- ✓ Compatible with various media, including cell culture and serum
- ✓ Equipped with a wide range of unique surfaces
- ✓ Possibility to combine with fluorescence and electrochemistry with dedicated flow-cells
- ✓ Flexible design, possible to combine with other analytical techniques
- ✓ Easy sensor handling with an elastomer-coated prism



“MP-SPR allows us to work with living cell monolayers grown directly on the sensor surface or with the aid of e.g. fibronectin and other growth promoting proteins. With MP-SPR, we are able to observe and quantify the differences in cell uptake kinetics of nanoparticles in dependence with the surface characteristics of the nanoparticle and their targeting.”

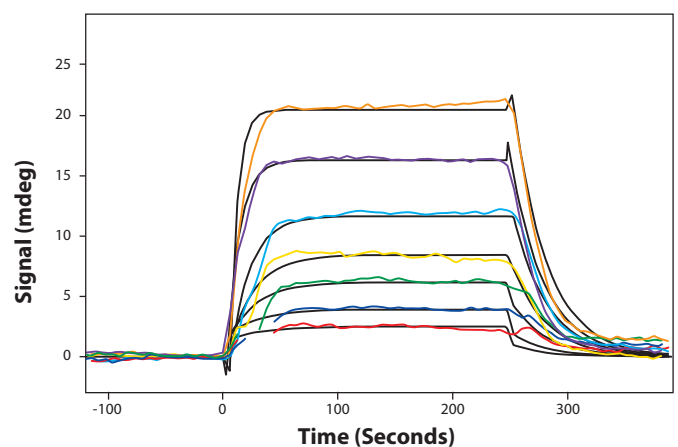
Prof. Tapani Viitala, University of Helsinki and Åbo Akademi University

Complete SPR curves



Complete SPR curves are measured simultaneously with four wavelengths and are fitted to determine layer properties, such as **thickness** and **refractive index** using dedicated LayerSolver™ software.

Analyte binding curves



Analyte binding curves, usually called sensograms, are fitted using TraceDrawer™ to reveal binding **affinity** and **kinetic** constants.



MP-SPR TECHNOLOGY

Unlock the full spectrum of molecular insights with MP-SPR's unique platform. Our state-of-the-art optical configuration, coupled with adaptable fluidics, empowers you to measure diverse parameters for molecular interactions and layer properties.

From traditional SPR to MP-SPR: From measurements to understanding

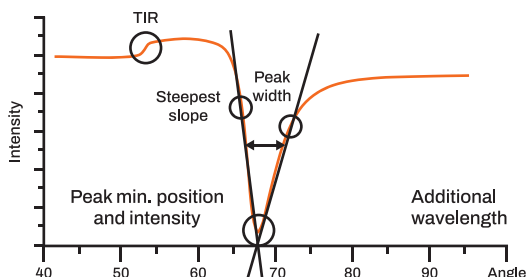
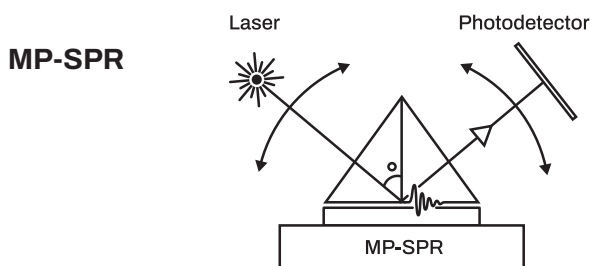
Surface Plasmon Resonance (SPR) is an established method for biomolecular interaction analysis. It is popular due to its high sensitivity as well as its capability to measure label-free and in real-time. Multi-Parametric Surface Plasmon Resonance (MP-SPR) is based on SPR principle, however its unique optical setup measures the complete SPR curve which enables new insight into interactions. Advantageous **PureKinetics™** feature provides measurements of lipids and biomaterials without bulk (solvent) effect and layer properties allows determine conformation of the molecules on the surface. MP-SPR expands the application range of traditional SPR from small molecules up to viruses, nanoparticles, biomaterials and living cells. Measurements can be performed also in complex media, such as 100% serum or samples containing cells.

MP-SPR measures surface interactions on metals, dielectrics and polymers, including cellulose, SiO₂, ceramics and graphene. In addition to kinetics, MP-SPR accurately measures the **thickness** and **refractive index** of thin films from a few Ångströms up to 20 microns. The unique capability lies in the MP-SPR measurement principle and measurement of complete SPR curve at multiple wavelengths of light.

What can you measure with MP-SPR?

Molecular interactions	Layer properties
Kinetics (k_a , k_d)	Refractive index (n)
Affinity (K_D)	Thickness (d)
Concentration (c)	Thickness & refractive index (n,d)
Adsorption/Absorption	Density (ρ)
Desorption	Surface coverage (Γ)
Adhesion	Swelling (Δd)
PureKinetics (k_a , k_d , K_D , c)	Extinction coefficient (k)
Electrochemistry (E, I, Z (ω)) Fluorescence	Optical dispersion (n(λ))

The table above shows properties that can be measured with MP-SPR and traditional SPR, and those that can be measured **only with MP-SPR**.

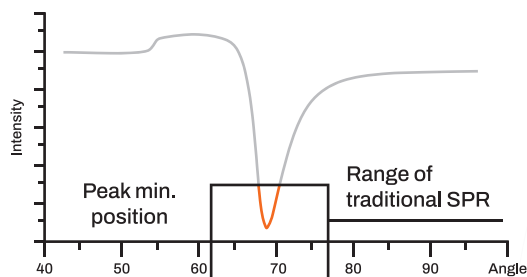
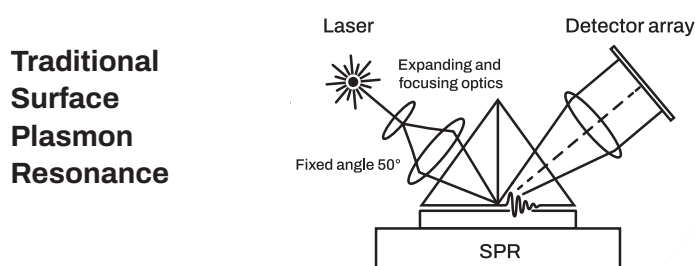


Goniometric arrangement

Typical range 1.0-1.4 of bulk refractive index

Wide angular range (up to 38 degrees)

Layers up to microns thick, in gas and in liquid



Focused beam arrangement

Typical range 1.33-1.38 of bulk refractive index

10 degree of angular range

Layers < 100 nm thick, in liquid



MP-SPR NAVI™ COMPARISON

Semi-automated

6-sample automation

384- or 96-sample automation

2-channel



MP-SPR Navi™
200 OTSO



MP-SPR Navi™
210A VASA



MP-SPR Navi™
220A NAALI

4-channel



MP-SPR Navi™
400 KONTIO



MP-SPR Navi™
410A KAURIS



MP-SPR Navi™
420A ILVES

All of our instruments are designed and manufactured in Finland. To honor the Finnish roots of our products, we named our instruments after Finnish wild animals. For example, our 'ILVES' instrument, named after the Finnish word for lynx.

Model

	MP-SPR Navi™ 420A ILVES	MP-SPR Navi™ 220A NAALI	MP-SPR Navi™ 410A KAURIS	MP-SPR Navi™ 210A VASA	MP-SPR Navi™ 400 KONTIO	MP-SPR Navi™ 200 OTSO
Number of fluidic channels	4	2	4	2	4	2
Autosampler for liquids	96 and 384 well plate, 6-vials	96 and 384 well plate, 6-vials	7-vials	6-vials	–	–
Unattended run	●●●	●●	●	●	–	–
Sample requirement partial/ full loop injection	70µL / 300µL	70µL / 300µL	70µL / 300µL	70µL / 300µL	– / 500µL	– / 500µL
Minimum injected volume	50 µL	50 µL	50 µL	50 µL	50 µL	50 µL
Buffer degasser	●●●	●●●	●●●	●●●	Opt. (●●)	Opt. (●●)
Compatibility with organic solvents	●	Opt. (●●)	●	●●●	●	Opt. (●●)

Functionality

Sensitivity	●●●	●●●	●●●	●●●	●●●	●●●
Kinetics and affinity characterization	●●●	●●●	●●●	●●	●	●
PureKinetics™	●●●	●●●	●●●	●●●	●●●	●●●
Concentration analysis	●●	●●	●●	●●	●●	●●
Thermodynamic analysis	●●	●●	●●	●●	●●	●●
Kinetic Titration	●●●	–	●●●	–	–	–
Living cell measurements	●	●●	●●●	●●●	●●●	●●
Electrochemistry measurements	Opt. (●)	Opt. (●●)	Opt. (●●●)	Opt. (●●●)	Opt. (●●●)	Opt. (●●●)
Fluorescence measurements	–	Opt. (●)	–	Opt. (●●)	–	Opt. (●●)
Additional lasers (-L): 2-4 wavelengths / flow channel	4X2L	2x2L / 3L / 4L	4X2L	2x2L / 3L / 4L	4x2L	2x2L / 3L / 4L
Sensor slide range	Carboxymethyl dextran (CMD), protein A/G, His-tagged, biotin, Regenerable avidin kit, Au, SiO ₂ , PDMS etc.					

MP-SPR Software

TraceDrawer™: Affinity, concentration and kinetics	●●●	●●●	●●●	Opt. (●●●)	Opt. (●●●)	Opt. (●●●)
LayerSolver™: Thickness and complex RI (refractive index)	●●●	Opt. (●●●)	Opt. (●●●)	●●●	Opt. (●●●)	Opt. (●●●)
Control and DataViewer	●●●	●●●	●●●	●●●	●●●	●●●

●●● Optimal ●● Excellent ● Good

Specifications are subject to change without prior notice.

SERVICES

In addition to instrumentation, BioNavis also offers measurement and testing services on a contract basis. Our experienced team collaborates closely with customers to customize projects according to specific needs.



We are here to help you find the best solutions for your research. Get in touch info@bionavis.com

www.bionavis.com

