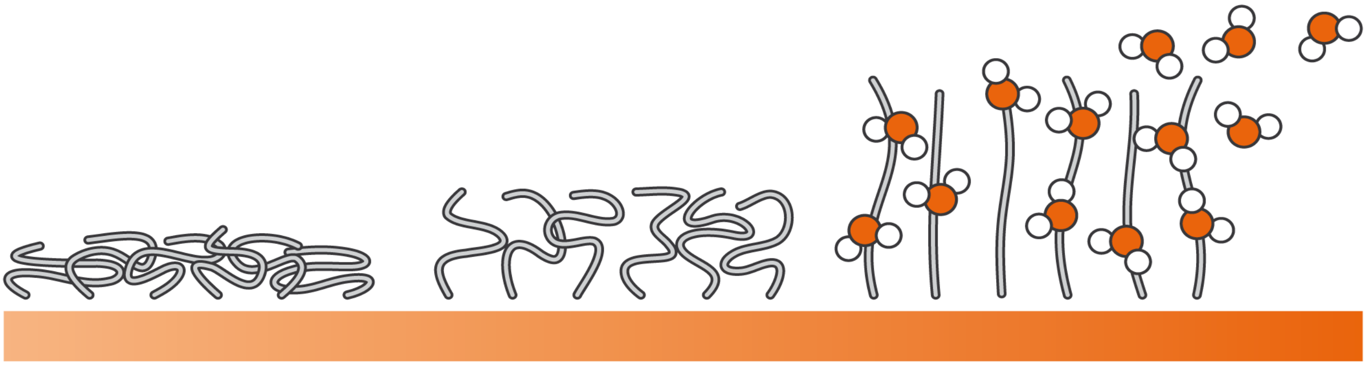
Biomaterials

# BioNavis

# QUANTIFY REAL-TIME LABEL-FREE SURFACE INTERACTIONS!

## Measure binding without water artifacts.



### Biomaterial applications of MP-SPR

Multi-parametric surface plasmon resonance (MP-SPR) instruments offer powerful capabilities for studying biomaterials, such as real-time monitoring, quantitative analysis, high sensitivity, versatility, label-free detection, multimodal analysis and surface characterization. These features make MP-SPR a valuable tool for biomaterial research, aiding in the development of biomaterials for various biomedical and biotechnological applications.

### KEY QUESTIONS MP-SPR CAN ANSWER IN RESEARCH OF BIOMATERIALS:

→ How does protein X interact with coating Y?

→ When does the responsive coating change its conformation?

→ How thick is the coating?

→ Which coating offers best gas/moisture/antireflective barrier?

→ How reproducible is the coating?

→ What is the release rate of drug X from material Y at pH Z?

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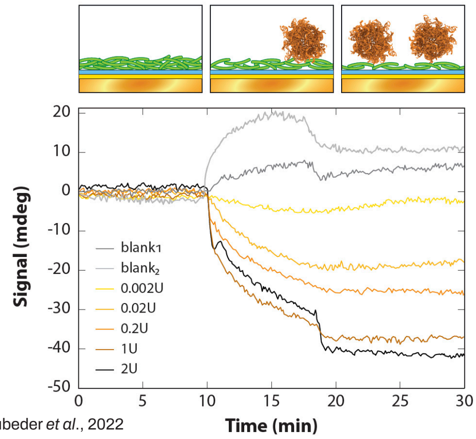
# WHY CHOOSE MP-SPR FOR BIOMATERIALS?

## The most sensitive instrument for real-time adsorption kinetics on surfaces

Due to its plasmonic principle, MP-SPR is the most sensitive measurement for kinetics on surfaces. This is important in real-time measurements of adsorption kinetics, swelling and release.



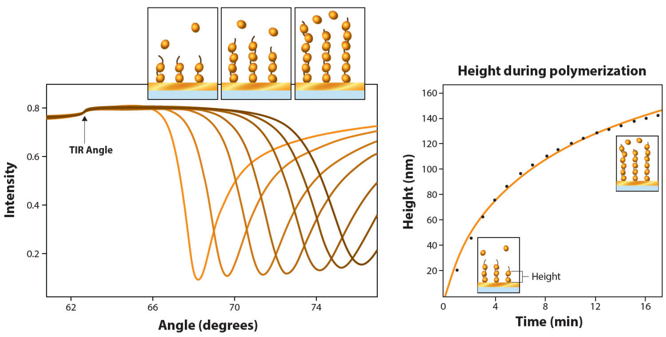

Schaubeder *et al.*, 2022

## Measure also thick samples

MP-SPR can measure even 20 µm thick samples. MP-SPR measurements can be performed at different pH, temperature (15 to 45 °C), electric potential and flow rate. The measurements do not require vacuum.

## Thickness and refractive index solved simultaneously

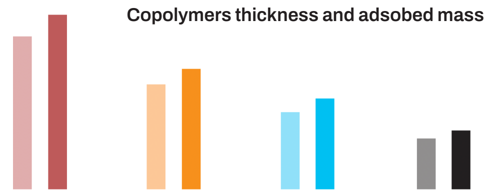
Thanks to our multiwavelength configuration with scanning angular range of almost 40 degrees, MP-SPR is capable of acquiring enough information to solve thickness and refractive index of the layer simultaneously using LayerSolver™.




Emilsson *et al.*, 2017

## No water artifacts

MP-SPR is an optical method, and therefore provides desired measurement of adsorbed molecules without solvent in interfacial layers (dry mass).




| | D74-EGMA118 | D74-EGMA54 | D74-RGMA17 | D33-EGMA52 |
|---|---|---|---|---|
| d(nm) | 7.8 | 5.4 | 4 | 2.6 |
| m (mg/m²) | 8.9 | 6.2 | 4.6 | 3 |

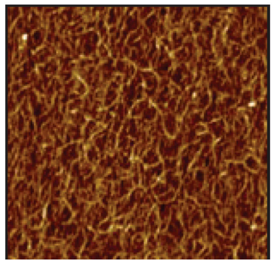
Vuoriluoto *et al.*, 2015

## Swelling measured *in situ* in air and liquid

Thanks to its goniometric configuration, MP-SPR works in both. This allows measurements from dry to wet state with the same configuration. You can also characterize your coating in organic solvents by equipping the instrument with a high chemical resistant flow cell.

## Cross-validation with microscopy and modelling is possible

MP-SPR with electrochemistry, fluorescence or another specialty flow cell allows for validation of measurements *in situ.*



Thanks to its oil-free operation, the same sample can be measured *ex situ* with AFM, SEM or other techniques.

Results from MP-SPR are absolute and therefore can be directly related to physical properties, validated by established theoretical models, and can be confirmed also analytically.

## Further reading

**AN#171** Thickness and refractive index calculation of transparent films

**AN#165** Hormone capture from water using cellulose fiber based yarn

**AN#163** Characterization of Chitin film

**AN#161** Polymerization kinetics

**AN#159** Vapour induced changes in polymers

**AN#158** Cellulose nanocrystals dispersibility

**AN#150** Organophosphonates adsorption

**AN#149** Polymer characterization - adsorption studies and layer thickness

## Selected publications


Responsive polymer bruch interfaces (Anderson *et al*., Langmuir, 2021)

Thickness and refractive index characterization by MP-SPR (Granqvist *et al*., Langmuir, 2013)

Nanocellulose characterization and interfacial water expulsion (Vuoriluoto *et al*., Journal of Physical Chemistry, 2015)

Monitoring of polymerization kinetics and morphology changes of brushes (Emilsson *et al*., Applied Surface Science, 2017)

Enzymatic degradation of xylan films (Schaubeder *et al*., Carbohydrate Polymers, 2022)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