

Solid Surface Charge

SurPASS™ 3



Streaming Answers: SurPASS™ 3

Analyzing surface properties can easily become very complex as many influencing factors have to be considered.

A direct method which delivers insights into the surface properties makes it possible to carry out routine tests and investigations under real-life conditions and is therefore the preferred choice.


With **SurPASS™ 3** for surface analysis you can generate a stream of answers for routine and individual tasks using real samples, independent of the sample geometry. The determined zeta potential is indicative for any changes occurring to solid surfaces. These changes may be the result of process treatments in production, environmental influences or due to common wear.

Using the “enhanced SurPASS principle”, plane solids, powders, fibers, foils, porous materials and materials with different surface roughness can be investigated directly without the need for model surfaces.

- ▶ Direct analysis of real samples
- ▶ For any sample geometry, size and origin
- ▶ Simultaneous measurement of pH, conductivity and temperature



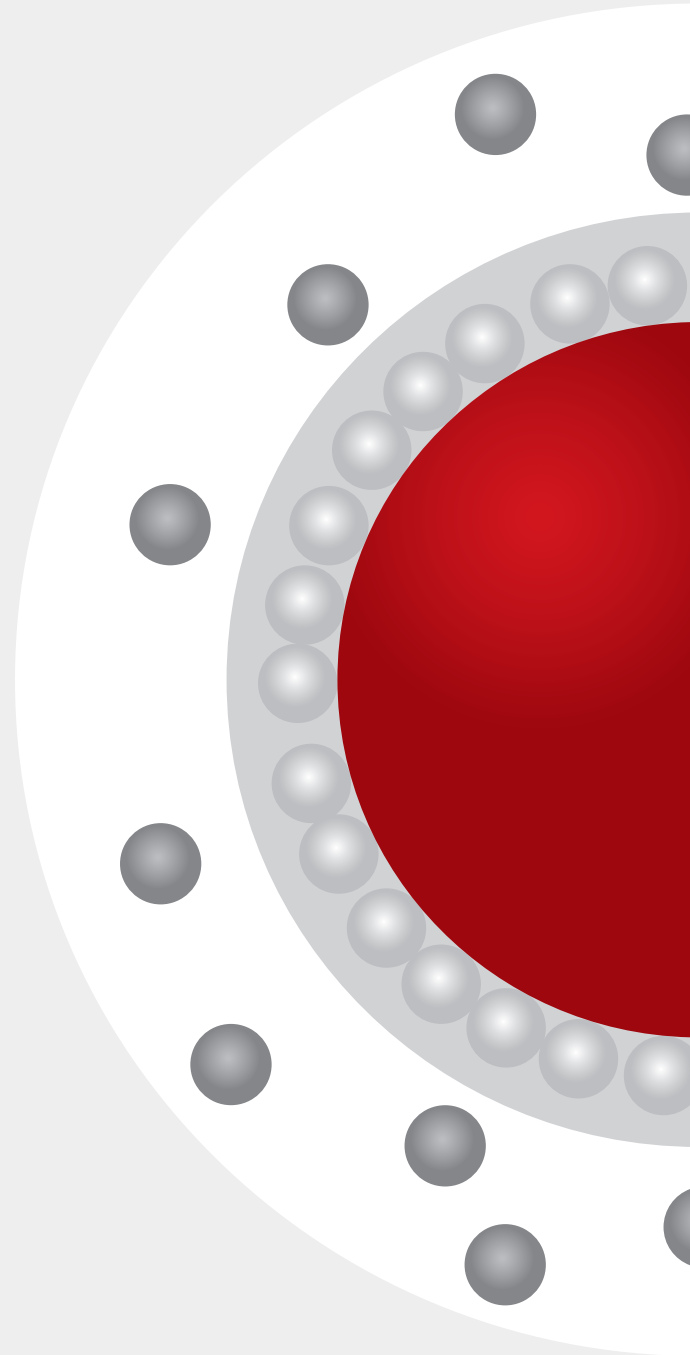
A step closer to the truth.



One instrument gives a stream of answers

Zeta potential reflects the individual surface properties and informs on:

- ▶ The charging behavior of your surface when in contact with a liquid
- ▶ The influence of pH and ionic strength
- ▶ The isoelectric point which is characteristic for the surface chemistry
- ▶ The presence of specific functional groups on the surface
- ▶ The success of surface modifications
- ▶ Adsorption and desorption behavior of additives on surfaces





You want to know the effect of external treatments on your material.

With SurPASS™ 3 you are able to follow the change of surface properties directly step by step.

- ▶ For enhanced polymers' wettability, printability or adhesion.
- ▶ For reinforced polymers' use as heavy-duty materials.

You seek to optimize a material's use under real-life conditions.

Changes in the behavior of surface properties during use can be observed under real conditions with SurPASS™ 3 without being restricted to model surfaces.

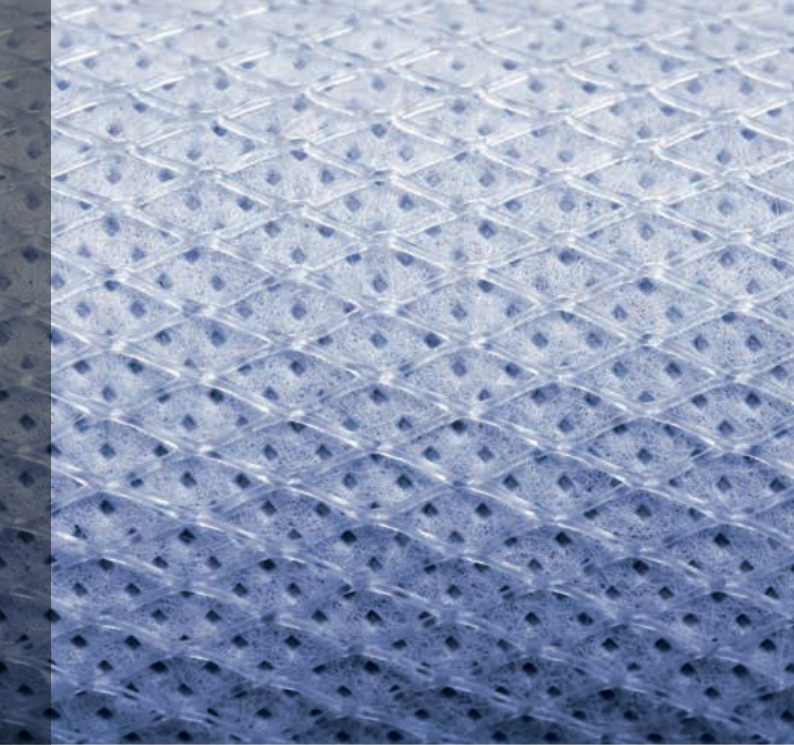
- ▶ For development of detergents with special cleaning effects.
- ▶ For perfect dyeing, washing and softening of special textiles.
- ▶ For developing hair care products like shampoos, conditioners, coloring and bleaching agents.



You aim to create surfaces with defined properties for special uses.

Alterations to surface properties due to physical and chemical treatments can be tracked with SurPASS™ 3. This gives insight into whether the treatment is appropriate for the intended use.

- ▶ For high-performance functional textiles which require the right surface properties for optimum functionality.
- ▶ For high-end membranes used in filtration and in the purification of water, wastewater or seawater to adsorb unwanted particles, bacteria or viruses.



You plan to save resources and reduce environmental impact.

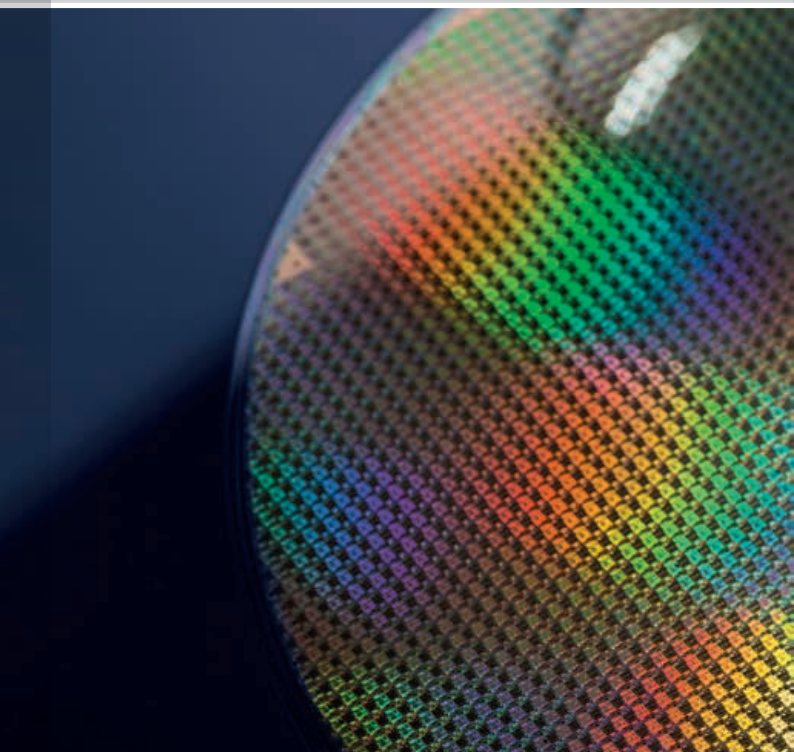
Every material shows signs of wear during use. In order to extend the material's lifetime, surfaces have to be modified to achieve higher stability and better chemical and weather resistance. The success or failure of surface modifications can be evaluated with SurPASS™ 3.

- ▶ For developing special coatings to make metals withstand the environmental influences which lead to corrosion.
- ▶ For preventing membrane fouling to get an expensive issue under control.

You strive to achieve biocompatibility to ensure health.

The human body reacts very sensitively to foreign substances and “invaders”. The zeta potential is an important parameter for biocompatibility studies as it visualizes the adsorption/desorption behavior of e.g. proteins on implant materials.

- ▶ For developing appropriate biocompatible surfaces as used in biosensors, hemodialysis membranes or medical implants.
- ▶ For producing optimal contact lenses and preventing bacteria adhesion.



You need to detect and remove trace contaminants to ensure purity.

With the “enhanced SurPASS principle” you have a highly sensitive method for detecting trace impurities and monitoring their removal during cleaning processes.

- ▶ For ensuring a wafer's purity during chemical mechanical polishing and optimizing the CMP process.
- ▶ For monitoring the effect and the efficiency of cleaning procedures used on special semiconductor layers to ensure proper functionality.

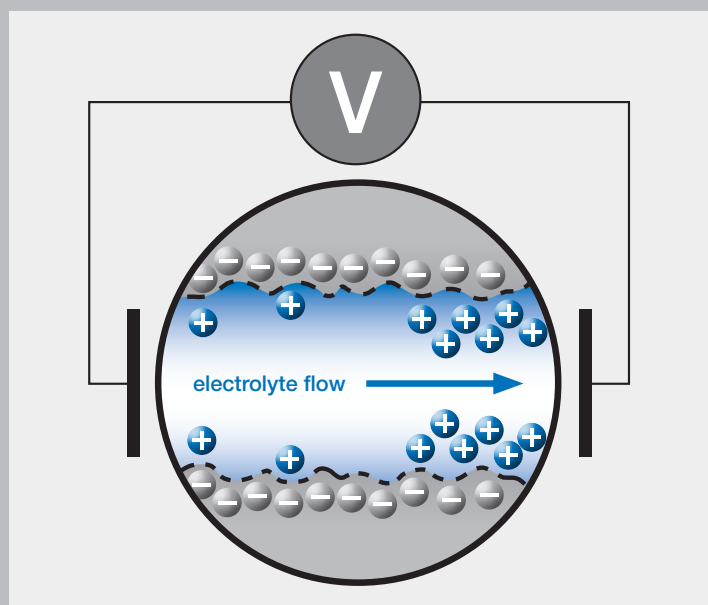
Pushing limits – streaming answers

SurPASS™ 3 brings you a step closer to the truth. The zeta potential values characterize surfaces and the changes occurring on surfaces due to external influences. Investigations are under real-life conditions and generate a stream of answers which can be applied directly to improve surface properties, processes and treatments.



Don't simulate – Measure directly

With SurPASS™ 3 there is no need to use model surfaces to understand surface characteristics. Measurement is performed on real samples without restrictions to the samples' origin. Porous or rough surfaces and swelling behavior do not affect the quality of the zeta potential measurement. You can investigate materials under environmental or process conditions.

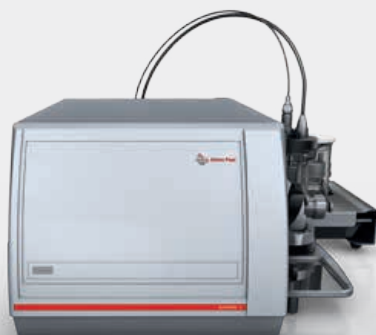


Enhanced SurPASS principle

The surface charge at the solid/liquid interface determines the electrostatic interaction between the solid surface and dissolved components in the liquid phase. It is therefore indicative for any changes relating to the solid surface and represents an important parameter for surface and material characterization.

The surface charge is related to the zeta potential at the solid/liquid interface. The surface zeta potential is derived from streaming potential, which arises from the motion of the liquid phase relative to the solid surface.

SurPASS™ 3 realizes the motion of the liquid phase in a vibration-free and pulsation-free manner, guaranteeing a continuous laminar flow of the liquid. This results in an improved measuring data quality with minimized noise.



Pushing limits with the “enhanced SurPASS principle”

Due to the nature of the measuring principle, SurPASS™ 3 is compatible with physiological conditions and high- and low-salt solutions of simple and complex electrolyte composition. You can simultaneously measure all necessary key parameters such as pH, conductivity and temperature. The enhanced SurPASS principle provides unsurpassed sensitivity of the measurement recording and data acquisition in high time resolution.



No restrictions: all samples are welcome

Independent of origin, shape, size or roughness, SurPASS™ 3 determines reliable and reproducible zeta potential values. Elaborate measuring cells for individual sample materials give you the utmost flexibility for your quality control and investigations. Automated features make measurement and data acquisition simple.

Main specifications

- ▶ The determination of the zeta potential is unlimited due to the used measuring principle.
- ▶ SurPASS™ 3 delivers reliable and reproducible results even at low zeta potential.
- ▶ Zeta potential reproducibility: ± 0.5 mV
- ▶ Isoelectric point reproducibility: ± 0.1 pH

SurPASS™ 3: fast – direct – universal



Easily fits into your lab

SurPASS™ 3 has a compact design with a small footprint of 612 mm x 536 mm (DxW). You can measure streaming potential, streaming current, cell resistance, pressure, pH, conductivity, temperature, adsorption kinetics and display zeta potential in one go.

Plug in and start

With SurPASS™ 3 there are no limits: You benefit from a wide range of different measuring cells which suit any sample geometry, size and origin. The measuring cell is recognized automatically.

Titrate pH trends automatically

A fully automated titration unit integrated into SurPASS™ 3 allows you to determine the pH trends and concentration trends of different additives.

Unique and unsurpassed possibilities – The Adjustable Gap Cell

For rectangular and disk-shaped solid samples like polymer films, membranes, QCM sensors.

- ▶ Sample size: 20 mm x 10 mm, 14 mm or 15 mm in diameter, thickness: max. 2 mm.
- ▶ Ideal for measurements on porous materials and materials which swell strongly.



Flexible and outstanding – The Clamping Cell

For planar surfaces like polymer films and sheets, metals, ceramics, glass and semiconductor wafers.

- ▶ Sample size: min. 35 mm x 15 mm, thickness: max. 20 mm.
- ▶ Enables the non-destructive measurement of samples with different thicknesses.



Easy Handling – The Cylindrical Cell

For natural or technical fibers and fabrics, granular samples, coarse particles.

- ▶ Sample weight: min. 100 mg, particle size: min. 25 μm .
- ▶ Versatile measuring cell with convenient and easy handling.



Straightforward analysis with the SurPASS™ 3 software

The SurPASS™ 3 software takes over most functions automatically for quick and easy measurements. Push the start button and straightforward analysis starts without the need for sophisticated evaluation or expert knowledge.



Status screen

- ▶ Setup of the measurement parameters, start and go.
- ▶ Real-time visualization of the key measurement parameters.
- ▶ Measurement data saved in MS Excel® format.

Zeta potential measurement

- ▶ Start a zeta potential measurement directly at defined pH value.
- ▶ The used measurement cell is automatically recognized.

Automatic detection of the isoelectric point

- ▶ SurPASS™ 3 automatically determines whether acidic or alkaline titration has to be applied.
- ▶ Highly efficient measurement mode.

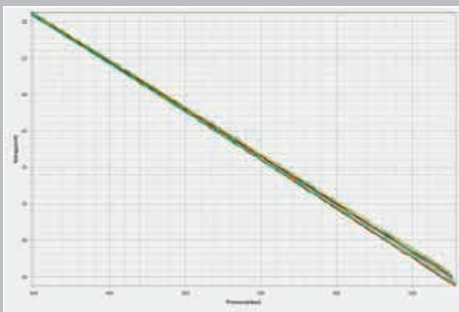
pH scan

- ▶ Automated pH titration over the desired pH range.
- ▶ pH sweep from pH 2 to pH 10 in less than 60 minutes.

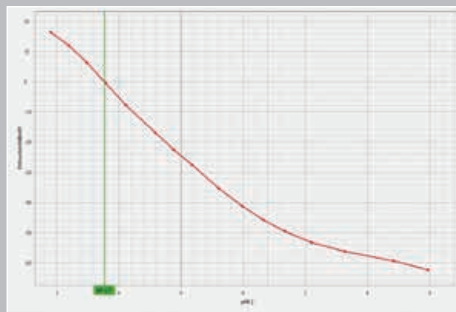
Adsorption and desorption studies

- ▶ Adsorption and desorption kinetics with >5 Hz sampling rate.
- ▶ Detection of additive concentration in the ppb range.

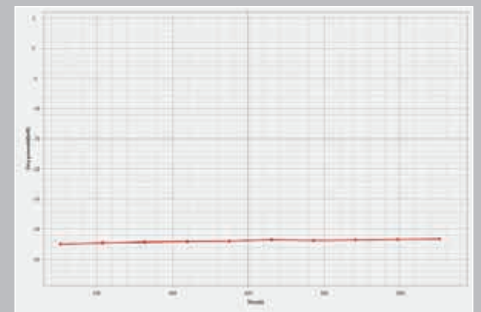
Switch between measurement screen and result screen



Display of measuring data
(pressure vs. voltage)



pH scan indicating the isoelectric point
(pH vs. zeta potential)



Stability of surface zeta potential
(time vs. zeta potential)

