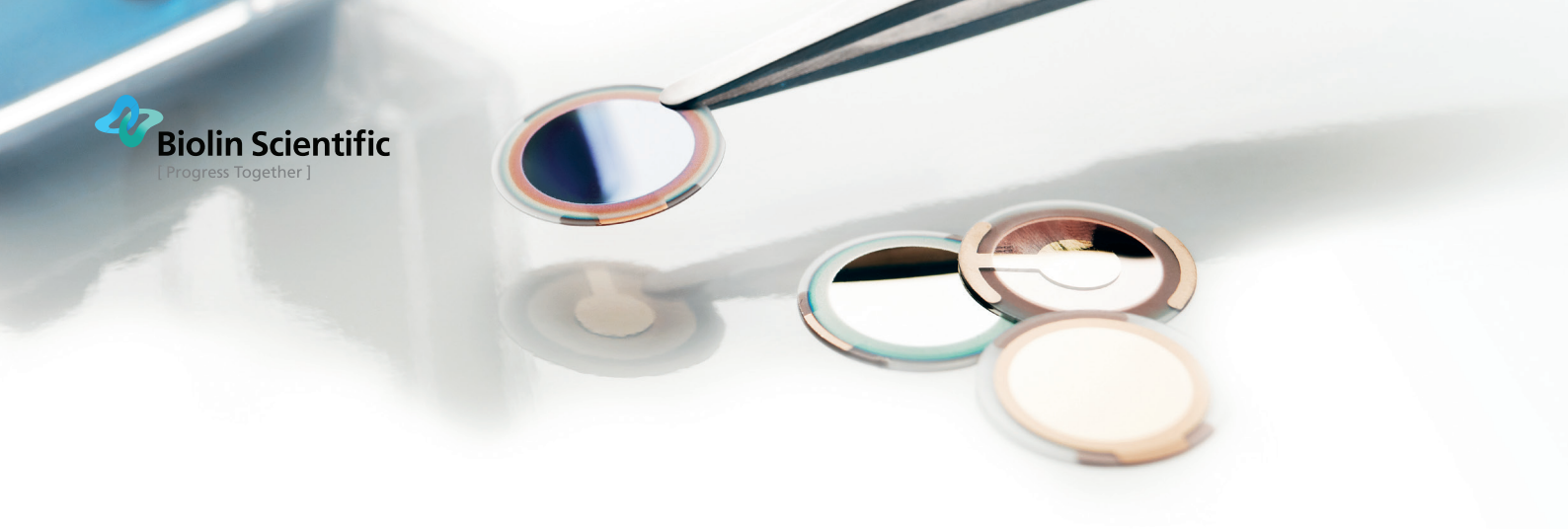
Biolin Scientific
[Progress Together]



PDMS QSense Sensor

Polydimethylsiloxane (PDMS) is a versatile material with properties that make it ideal for a variety of applications. Its biocompatibility ensures safe interaction in biological environments. The chemical inertness and thermal stability of PDMS ensure it does not react with or degrade under physiological conditions. These characteristics make PDMS an excellent choice for lubrication of syringes and similar lab wares, where maintaining the integrity of stored fluids and biological samples is crucial. Additionally, its thermal and electrical insulation properties protect sensitive samples and components. Despite its hydrophobic nature, surface modification techniques can enhance its hydrophilicity for better performance with aqueous solutions. These combined properties, along with its low cost and ease of fabrication, make PDMS invaluable in both research and industrial settings.

Reproducibility

Consistent measurement results are essential for any method to be considered reliable and applicable in research. At Biolin Scientific, we have a rigorous QC process to ensure our products meet the highest standards, with reproducibility as a key focus. To enhance our evaluations, we collaborate with leading institutes. For instance, BASF in Germany tested our PDMS sensors for antibody adhesion. The results below demonstrate the high accuracy and reproducibility of our PDMS surface coating.

Evaluation by BASF

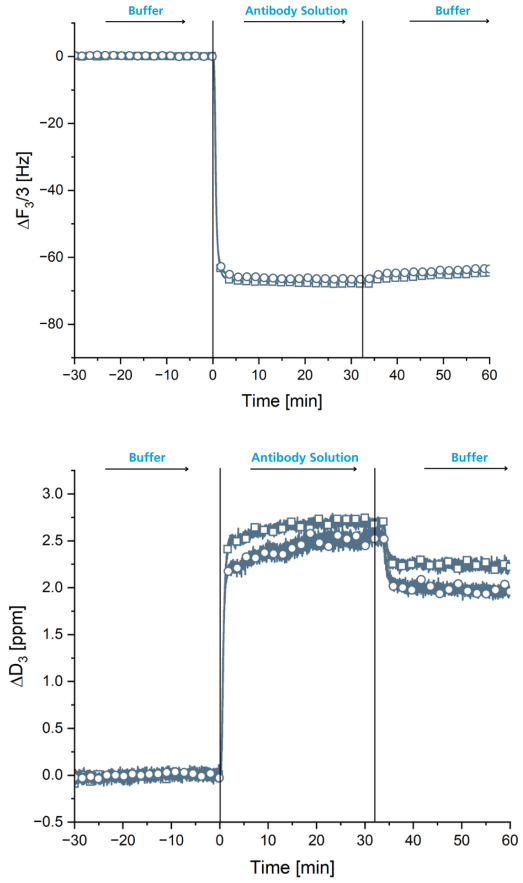


Figure 1: Reproducibility test of polyclonal antibody adhesion on two PDMS sensors using QCM-D by BASF. The first graph shows frequency changes, and the second graph illustrates changes in dissipation energy.

QSense Standard Sensors

The standardization of a sensor involves comprehensive data collection and detailed measurements of the coated material in various environments. This process includes rigorous testing to verify sensor performance. Once standardized, the sensor consistently delivers reproducible results across different production batches, ensuring reliable material properties. Standard sensors undergo validation measurements specific to the surface material, confirming their applicability and reliability in research.

PDMS in QCM-D Measurements

Case example: Analyzing the adsorption of mAbs to silicone oil

Pre-filled syringes are commonly used for storing and administering biopharmaceuticals. During these processes, the drug interacts with materials such as the glass syringe barrel, plastic cap, and metal needle. These interactions can lead to adsorption, concentration loss, and protein particle formation, potentially causing incompatibilities. Discovering these issues late can disrupt development timelines and result in high costs. Early screening for surface-induced instabilities can help mitigate these risks. QSense QCM-D analysis is effective for assessing antibody adsorption, providing insights into potential incompatibilities. It can also suggest mitigation strategies, such as using non-ionic surfactants to protect the PDMS layer from interacting with monoclonal antibodies (mAbs). For example, using a PDMS sensor with the QCM-D technique can simulate the silicone oil-coated syringe barrel to study mAb adsorption.

PDMS QSense Sensor

- **Sensor Name:** QSX 348 – PDMS
- **Coating Material:**Polydimethylsiloxane
- **Coating Thickness:** 200nm
- **Coating Roughness:** <0.7nm
- **Shelf Life:** 8 months from the delivery

Experimental procedure and results

The PDMS-coated sensor was first exposed to buffer to create a baseline. mAb was then introduced and after 2h of mAb exposure there was a rinse with buffer. The time resolved QCM-D raw data, Fig. 2, reveals the mAb-PDMS interaction dynamics and uptake. Upon surface exposure, the mAb adsorbs to the PDMS, and the adsorbed layer remains at the surface after rinse. The ΔD/Δf-ratio (data not shown) indicates that the mAb unfolds on this very hydrophobic surface when hydrophobic pockets on the protein bind to the sensor a scenario which has been suggested as the driving factor for particulate formation and aggregation in silicone oil coated pre-filled syringes [1]

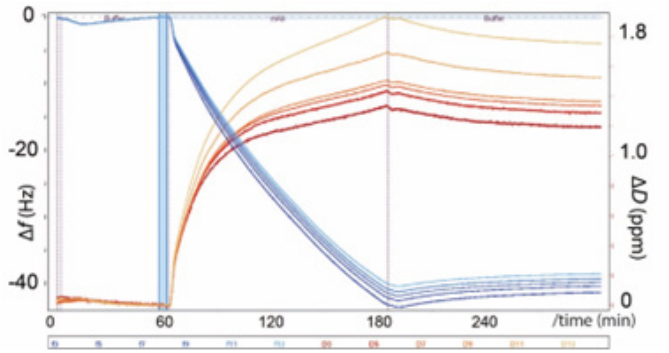


Figure 2: QCM-D raw data, Δf and ΔD, showing the time resolved mAb - PDMS surface interaction.

Reference

1. P. Arosio, et al, J. Pharm. Sci, 2023, 112, 337-38

Visit our webiste to access a variety of sensors for your research needs -

www.biolinscientific.com/sensors

About us

At Biolin Scientific we are committed to empower professionals in Surface and Interface science and engineering to reach outstanding results faster and easier. Our instruments and sensors are tailored for advanced analysis of thin film properties and surface and interface phenomena at the nanoscale. Trusted by top universities and industrial labs worldwide, our premium solutions help solve complex challenges and drive progress in scientific research and product development. We firmly believe that brilliant minds deserve state-of-the-art instruments and expert support. Let's progress together.

Biolin Scientific AB
Hängpilsgatan 7, SE-426 77 Västra Frölunda, Sweden
info@biolinscientific.com | biolinscientific.com

Biolin Scientific
[Progress Together]