QSense

Complete Range of Premium QCM-D Instruments

Biolin Scientific
[Progress Together]

Join the QSense Community

Investing in a QSense® QCM-D instrument is an excellent choice providing you with a premium system for measurements of surface interactions at the nanoscale. With more than 1000 instruments installed in labs across the world, the QSense community keeps on growing with new interesting application areas. Find the instrument best suited for your research needs and join the QSense community!

By Scientists for Scientists

The foundation for the first commercial QCM-D instruments was created by Scientists in a laboratory at Chalmers University of Technology in Sweden in the 90s. A lot has happened since the first prototype, the QSense instrument range has grown wider alongside the interest for the technology from the scientific community. Today, the instruments are used at research facilities worldwide and in a vast variety of applications within areas such as pharmaceuticals, biotechnology, energy, and electronics.

Get the full picture of your molecule-surface interactions

QSense instruments track changes in frequency and dissipation when molecules bind and interact on the oscillating QCM-D sensor, in real-time. From this information it is possible to quantify mass, thickness, viscosity and shear modulus of the adhering layer.

Analyze events such as

- Adsorption/Desorption
- Binding
- Degradation
- Cross-linking
- Swelling/Collapse

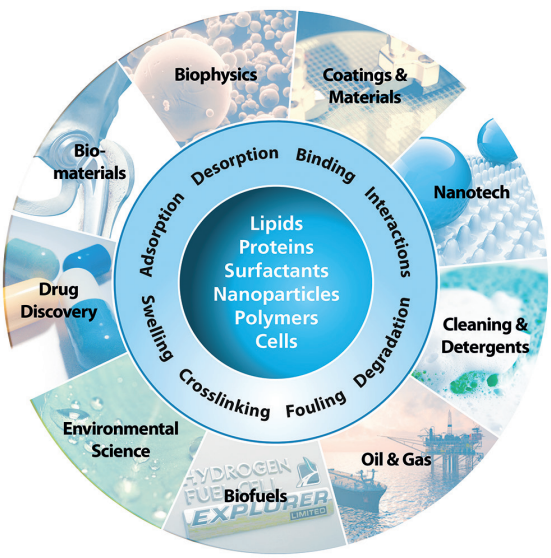


Figure 1 Application areas, phenomena and materials relevant for QCM-D research.

QSense Omni

QSense Omni is the new, cutting-edge instrument from the pioneers of QCM-D. Based on established technology, which has supported a deeper understanding of surface and interface interactions for decades, QSense Omni gives you sharper QCM-D data and a smooth journey in the lab. Unfold unique insights quicker and base your decisions on reliable results from highly controlled measurements.

reddot winner 2023
industrial design

Most suitable when:

You want ease of use
Get up and running with this out-of-the-box solution. Everything you need to get started is included.

You want flexibility
Build the system to suit your needs, now and in the future.

You want automation
Minimize hands-on time and maximize reproducibility.

You value working with the best
Trust the results you get from the next-generation premium QCM-D instrument.

3 reasons to invest

Easier data interpretation

Through leading signal processing and a fast and reproducible liquid exchange, QSense Omni gives you sharper and more concise data. For easier and more confident data interpretation and analysis.

Smooth journey

Running successful QCM-D experiments with trustworthy and reproducible results has never been easier. Thanks to intuitive design, smart workflows and clever automation, productivity will increase, and you can spend your working-day more efficiently.

Grow with your research

With bold design and smart functions, QSense Omni is made for scientific progress and future innovation. By upgrading to more channels, or adding QSense Orbit for complementary measurements, you can go beyond entry capabilities, and grow with your research.

First impressions from beta testers - BASF SE

"I observed reduced cross-contamination, which is crucial for obtaining accurate data. I recognize the potential and value of this in our future studies" - **Peter Stengel**

"From my initial experience conducting the experiment, it became evident that it was designed with ease-of-use in mind, making it accessible to multiple users at the same time with no difficulties" - **Franziska Tauber**

QSense Pro

QSense Pro is the premium option for large-scale QCM-D analysis. The fully automated system provides you with high quality data and reproducible results with its user-independent operation.

Most suitable when:

You need maximized throughput
The 8-channel system can produce a lot of data every day.

You want to test and compare samples
8 channels and 4 separately controlled syringe pumps let you evaluate several samples and parameters in one go.

You need highly reproducible results
The fully automated system minimizes human errors and maximizes user-independence.

You want to conduct experiments in both high and low temperatures
The instrument works with a temperature range between 4-70 °C.

You need more time
The system can be pre-programmed and left unattended during experiments, leaving you with time to do other things.

3 reasons to invest

Increased productivity

The 8 channels of QSense Pro give you an opportunity to be fast and to produce lots of data every day. The fully automated system can be pre-programmed and left unattended during experiments, saving your time.

Compare several samples at the same time

Syringe pumps that run separately enable 4 channels to be used independently with different samples and measurement sequences. Hence, you can evaluate several parameters in parallel.

Highly reproducible results

Automated measurements decrease the risk of user dependency and give you more reproducible results. Also, high precision flow-control is ensured by syringe pumps. Programming of automated mixing, including gradients of samples, increases reproducibility.

What our customers say

"We can monitor the mass change of our system in real-time. I can tell you that for every electron moved, this amount of mass changed. That's powerful. You can't really get that with any other system."

Jodie Lutkenhaus,
Associate Professor,
Texas A&M University, US

QSense Explorer

Discover the many possibilities of our most versatile and modular QCM-D instrument. QSense Explorer is designed to provide high quality data for trustworthy results regardless of your measurement conditions. The many configuration options allow for the widest variation of experimental setups and combinations with complementary techniques.

Most suitable when:

You want to maximize the available experimental context
The possibility to combine QCM-D with other techniques invites you to expand the understanding of your surface processes.

You want to study under a wide range of conditions
Depending on your specific research needs you can create a QSense Explorer configuration compatible with temperatures up to 150° C and variable gas phase pressures. You can also build your instrument with the ability to withstand harsh solvents.

3 reasons to invest

Superior data quality and versatility

QSense combines leading measurement performance and stability with the most versatile design. The modularity allows for plenty of experimental possibilities and has the flexibility for you to change between different experimental setups if required.

Combine with other techniques

Our specialty QSense modules enable simultaneous QCM-D measurements with other techniques, e.g. microscopy, electrochemistry and ellipsometry, on the same sample.

Run experiments under special conditions

Extreme temperatures, variable gas phase pressures and the use of harsh solvents. QSense Explorer can handle them all.

What our customers say

"We regard QCM-D as a valuable measuring tool due to its high sensitivity and stability and find it applicable for versatile studies because of its availabilities of sensors with various different types of surfaces."

Kenichi Sakai,
Associate Professor, Tokyo University of Science, Japan

QSense Analyzer

Both fast and versatile, QSense Analyzer provides you with high quality data from 4 temperature-controlled channels in parallel. The system is a good fit for testing and comparing different samples at the same time. In addition to the high throughput, QSense Analyzer delivers trustworthy results in a broad range of measurement conditions and can be complemented with accessory chambers and modules to expand the capabilities even further.

Most suitable when:

You are interested in high throughput

The system has 4 channels for simultaneous measurements making it an excellent choice for rapid data collection.

You want to test and compare samples

Running several samples at the same time lets you evaluate different parameters in one go.

You want to study a broad range of scenarios

QSense Analyzer supports a temperature range between 15-65 °C and the possibility to use harsh chemical solvents.

You need the possibility to expand your experimental setup

Add accessory chambers and modules to explore more experimental opportunities, extended measurement conditions or combination with complementary techniques.

3 reasons to invest

More data, faster

QSense Analyzer lets you speed up your work in the lab without losing data quality, so that you can generate more data and get faster results. The 4 separate flow channels enable the evaluation of different substrates and/or samples in parallel and simplify data comparison.

First-class versatility

QSense Analyzer gives you the possibility to run experiments in special conditions, for example at high temperature or using harsh chemicals. Flow modules can be configured in series, parallel or a combination to suit your experimental needs.

Superior data quality

QSense combines leading measurement performance and stability, continuously optimizing the data collection for maximum data quality.

What our customers say

"QSense instruments are a great tool for our biophysical research. They enable rapid screening for biomolecular interaction at lipid bilayers and also allow optimizing the parameters for deposition of thin films."

Professor Dr. Marité Cárdenas,
Health and Society,
Malmö University, Sweden

QSense Initiator

Get started with QCM-D technology using QSense Initiator. The instrument features core functions of QCM-D measurements and produces high quality data.

Most suitable when:

You are getting started with QCM-D
A clean design and straightforward software makes QSense Initiator perfect as an introduction with the QCM-D technology.

You are looking for the basics
The instrument supports all the core functions and basic qualities of QSense.

You need to study interactions qualitatively
But not to quantify your films.

You will experiment within a limited temperature range
You are performing your measurements between 20-45 °C.

Still not sure which instrument to choose?

Our tool InstruMentor will guide you along the way to your new instrument. Just answer a few questions and the instrument selector will provide you with the top choices based on your specific needs.

3 reasons to invest

Ease of use

QSense Initiator is designed to meet your basic needs in QCM-D technology. The instrument is easy to set up and run.

High quality data

Excellent temperature and measurement stability, in combination with the measurement of two harmonics, ensure accurate and reliable measurements.

One channel, plenty of possibilities

This 1 channel system has high chemical compatibility and works with the entire range of QSense Sensors which gives you a wide variety of experimental possibilities.

What our customers say

"I have found QSense to be one of the best techniques for an undergraduate lab because it's turnkey and it requires very little maintenance."

Malkiat Johal,
Professor of Chemistry,
Pomona College, US

Enjoy World-leading Technology

The first step to trustworthy results is to make sure your data reflects the surface interactions under study, and not uncontrolled interference from external factors. The excellent measurement stability and low drift of QSense instruments are key to protecting your data from artifacts, whether you perform shorter or longer measurements. Superior temperature stability, and well-designed and robust electronics ensure that the measured QCM-D response reflects actual changes in the system under study rather than uncontrolled interference.

Next, make sure you choose the technology with the best ability to catch the processes you want to study. The unique QSense Decay Technology is the fastest and most accurate way to measure frequency and Dissipation. Continuous optimization of the data acquisition continues to translate theoretical performance parameters into actual data quality in real measurement situations, making it possible to quantify even the smallest and fastest changes in mass or viscoelastic properties.

QSense key features

- **Robust design**
  Protects the measurements from external shock or vibrations.
- **Superior temperature and measurement stability**
  Safeguards against artifacts.
- **Measurement of 7 harmonics**
  Provides maximal information and allows for quantification of soft layers through full viscoelastic modelling.
- **Minimal noise**
  Distinguishes small changes in mass and viscoelastic properties from noise.
- **QSense Decay Technology**
  Optimized time resolution and data quality to catch the smallest and fastest events and processes, in rigid as well as in soft films.
- **QSense Smart Tuning**
  Continuously fine-tunes the sampling to optimize the data quality in each measurement situation.
- **Flow module with homogenous flow profile**
  Ensures even sample exposure, good thermal stability and lowers risk of trapping air bubbles.

Please note that QSense Initiator is a simplified instrument with only the core functionality of QSense QCM-D technology, and it is therefore not including all of the features.

QSense Decay Technology

With the unique decay-based QCM-D technology, QSense instruments are the only instruments on the market offering high accuracy in *f* and D changes in combination with speed. In brief, the sensor is excited to resonance, and the decay curve is analyzed under non-voltage conditions as the sensor oscillation is damped. Each sensor excitation results in independent and true values of *f* and *D*, and can be repeated up to 300 times per second. This can be related to QCM-D instruments based on e.g., impedance analysis, which requires either several datapoints to calculate each *f* and *D* value or uses locked stimulation and derived *f* and *D* values at cost of catching large frequency shifts.

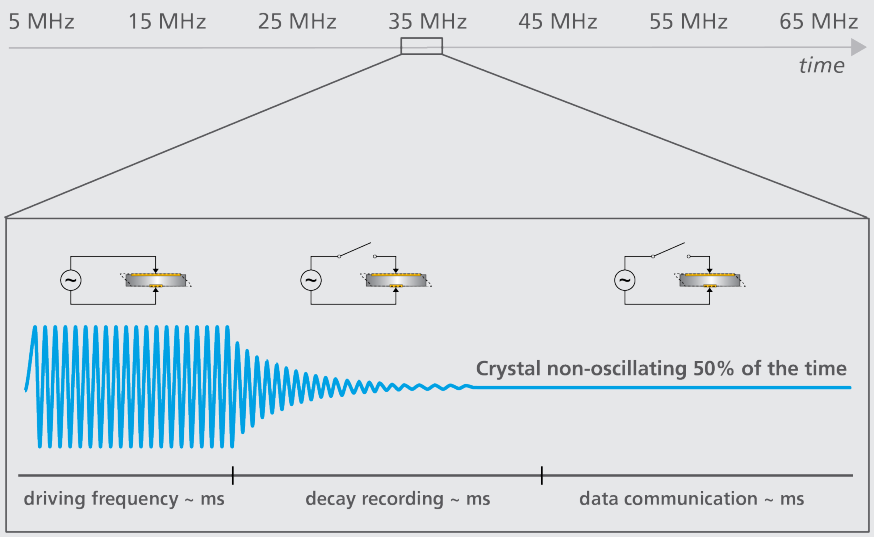


Figure 2 QSense QCM-D sampling

In detail

- Excellent measurement accuracy and stability are achieved through non-voltage readout of *f* and *D*, free from disturbances from parallel impedances.
- Fast sampling with up to 300 *f* and *D* values per second, allows for rapid kinetics experiments.
- Uninterrupted tracking of not only rapid and slow changes, but also small and large shifts in *f* and *D* for all harmonics. The full range of events, from sub-monolayer uptake at the surface to medium exchange from air to liquid, is automatically captured, without compromising the time resolution.
- Measurement of multiple harmonics enables quantification of changes in soft layers and in viscoelastic properties. Changes in layer thickness can easily be distinguished from changes in viscoelastic properties.

QSense Smart Tuning

QSense Smart Tuning tracks your signal to always give you the best possible noise level and sample rate no matter whether you are building thick and soft layers, or thin and rigid films. The Smart Tuning algorithm analyzes the output quality of each *f* and *D* readout and fine-tunes the settings for the next decay-curve acquisition.

Why use 5 MHz Sensors?

Sensitivity, sensing depth, and the ability to perform viscoelastic modeling are optimized by using 5 MHz sensors.

- The theoretical mass sensitivity increases with the fundamental, but so does the noise. This means that a high fundamental frequency does not directly correlate with a better mass detection limit, more important are signal-to-noise ratio and long-term stability.
- The sensing depth decreases with the resonance frequency. The lower the resonance frequency, the thicker the layer that can be sensed.
- To perform full viscoelastic modeling, information on frequency and dissipation from multiple harmonics is needed. The fundamental affects how high the frequency of the harmonics will be, and as the impact of noise will be more noticeable as the frequency increases, a low fundamental is desirable.

Explore More

Widen your possibilities with our modules

Our add-on modules and chambers give you the possibility to combine QCM-D measurements with other techniques, apply alternative experimental setups or extend your measurement conditions. Have a look at a selected range of available modules and chambers to find the best choice for you. For the full range, visit biolinscientific.com

QSense Window module
Giving optical access to the sensor surface, this module enables simultaneous QCM-D and microscopy measurements on the same surface. You can also perform light or irradiation sensitive measurements.

QSense Electrochemistry module
Want to conduct simultaneous QCM-D and electrochemistry measurements on the same surface? This module supports a wide range of electrochemical methods, for instance cyclic voltammetry and electrochemcal impedance measurements to explore polymer behavior, electrostatic interactions, corrosion, etc.

QSense Window Electrochemistry module
The module enables simultaneous QCM-D and electrochemistry measurements with optical access to the sensor surface. This module is typically used in applications like photovoltaics.

QSense Ellipsometry module
QSense Ellipsometry module lets you perform simultaneous QCM-D and ellipsometric measurements on the same sensor surface. Combining both techniques can add insight into the solvent content, which is valuable in applications spanning from polymer studies to vesicles.

QSense High Temperature chamber and module
The QSense High Temperature chamber and module allow 1 channel measurements in the 4-150°C temperature range, in both flow and stagnant conditions.

QSense High Pressure chamber and module
The QSense High Pressure chamber and module allow you to run experiments at elevated pressures and temperatures. The system is capable of running at pressures up to 200 bar and temperatures up to 150° C. We also offer customization to suit your specific research needs.

Please note that QSense Initiator is not compatible with QSense add-on modules and chambers. Some add-on modules have limited compatibility with QSense Omni.

Selected modules

QSense Window module

QSense Electrochemistry module

QSense Window Electrochemistry module

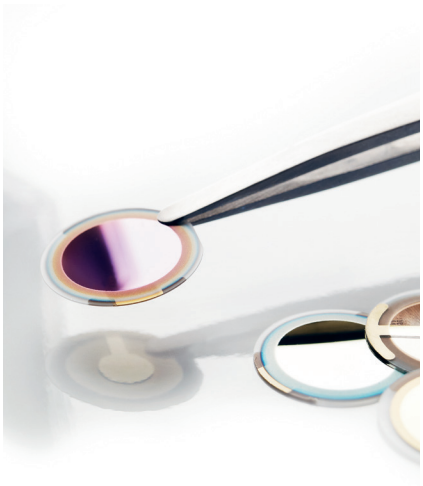
QSense Ellipsometry module

QSense High Temperature chamber and module

QSense High Pressure chamber and module

Choose between a variety of sensors

QSense sensors are at the heart of the QCM-D measurement. The validated QSense sensors will give you the most stable, reliable and reproducible data out of your QSense system. With the widest range of sensors on the market, and the option to have them tailor-made for your needs, we get you as close to real-life conditions as you can possibly get.



Custom-made for you

The choice of sensor coating is crucial for your experiment. We offer 30 standard sensor coatings and more than 20 tailor-made sensors representing various materials including metals, oxides, carbides, polymers, functionalized coatings and standardized soils. We also have the capability to develop specific coatings based on your requirements.

Discover our intuitive analysis software

Reveal the full potential of your data with Dfind - the reliable and easy-to-use analysis software from QSense. It helps you to quickly and simply extract the information you are looking for, such as mass, thickness, viscoelastic properties and adsorption rates.

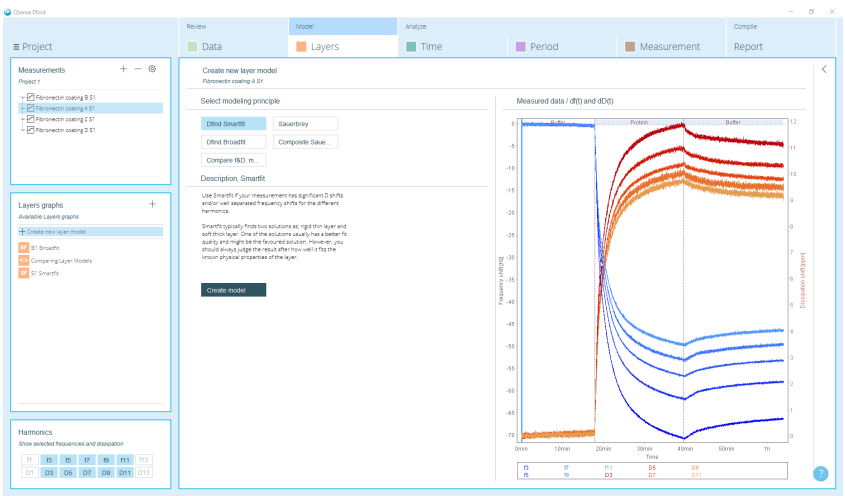


Figure 3 Data analysis software QSense Dfind

Dfind features

- **Automated full viscoelastic modeling**
  Up to 5 fitted parameters - time resolved mass, thickness, viscosity, shear modulus and the frequency dependence of the viscosity and shear modulus.
- **Dynamic output data**
  Including kinetics, slope, rise time and more.
- **3 modelling methods and traffic lights**
  Indicating the quality of each model fit.
- **Automatic data plotting and reporting tool**
- **More than 10 pre-defined methods for data extraction**
- **Batch mode for simultaneous analysis**
  Process more than 100 datafiles at the same time and easily add new data files step-by-step.
- **Template tool**
  Supporting reuse and sharing of data analysis templates with other users.

Specifications

Compare QSense instrument specifications

It’s crucial to comprehend the technical features of your research equipment. To simplify this process, we’ve designed a tool that can help you. All the QSense instrument specifications are available on our website for your convenience.

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About us

We are Biolin Scientific. A worldwide company making state of the art instruments and smart solutions for scientists. Knowledge is our greatest resource and an essential part of everything we do. In collaboration with leading universities and industries, we solve challenges to simplify everyday life in the lab. Our customers are experts in surface science, and we have the tools for them to progress.

Biolin Scientific AB
Hängpilsgatan 7, SE-426 77 Västra Frölunda, Sweden | +46 31 769 7690
info@biolinscientific.com | biolinscientific.com

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