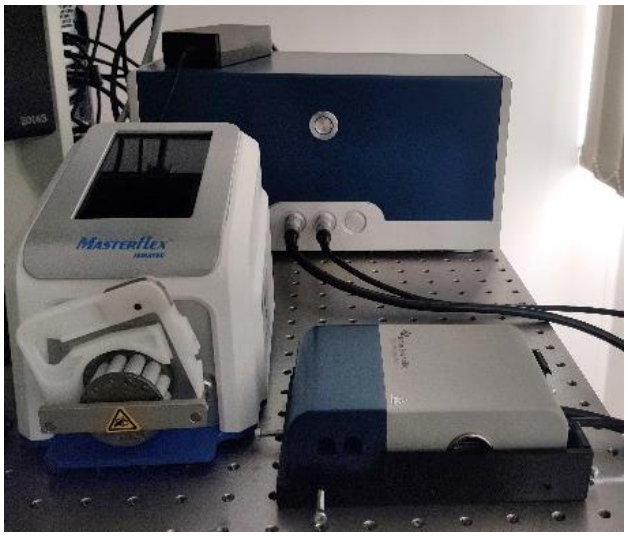
Quartz Crystal Microbalance with Dissipation monitoring (QCM-D) (QSense Explorer, Biolin Scientific, Sweden)



Quartz Crystal Microbalance with Dissipation monitoring (QCM-D) is a real-time, surface sensitive technique for analyzing surface-interaction phenomena, thin film formation and layer properties. In addition to the changes in mass, QCM-D also captures changes in energy loss. This additional information provides insight into the viscoelastic properties of the system under study and can reveal structure as well as structural changes, such as *swelling, crosslinking and collapse, of the molecular layer at the sensor surface*.

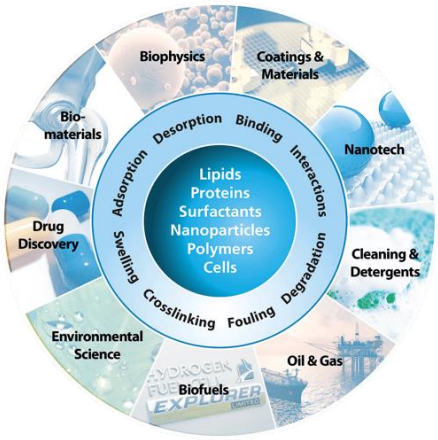
Main Components: The QCM is an acoustic technology. The system includes the QE 401 electronic unit, QCP 101 chamber platform, QFM 401 flow module, QWM 401 window module, and QSoft401 acquisition software.The sensor consists of an AT-cut quartz crystal coated with a 100 nm gold film, enabling simultaneous measurements of frequency and energy dissipation. Changes in apparent mass and mechanical properties are derived from variations in frequency and dissipation, allowing the determination of viscosity and the shear elastic modulus of adsorbed films. The system can operate in either continuous-flow or stop-flow mode, with precise temperature control.

Performance: The system provides high sensitivity, with a frequency measurement precision below 0.1 Hz (depending on the set parameters), and enables simultaneous acquisition at the fundamental frequency of 5 MHz and at odd harmonics (15, 25, 35, 45, 55, and 75 MHz), allowing complex analysis of the viscoelastic behavior of nanometric layers. The QFM 401 module enables viscoelastic measurements in the 20–120 °C range, with a precision of ±0.02 °C. The system is connected to a Masterflex peristaltic pump, which provides adjustable flow rates between 1 and 1400 µL/min. The QWM 401 module, equipped with a sapphire window, allows spectroscopic or microscopic measurements to be performed simultaneously with QCM-D analyses, at temperatures up to 80 °C.

Total Value: 539975 RON

Year of Acquisition: 2024

Fields of Application: QCM-D measures at the nanoscale, and the detection range is ~1 Å to 1 um, depending on the layer properties.



Typical molecules and entities that are studied are ***biomolecules, surfactants, polymers, nanoparticles, cells and other structures in the same size range.***

QSense QCM-D technology allows you vary key parameters such as:

- Surface material
- Sample concentration
- Temperature
- Solvent
- pH
- Ionic strength

Availability for Access and Use:
Contact Person: Assoc. Prof. Dr. Monica Focșan (email: *monica.iosin@ubbcluj.ro*)

Access available by appointment via email, between 09:30–17:30, for preliminary evaluation of sample complexity and estimation of measurement duration.

Usage Conditions: Exclusive operation by the designated specialist personnel.

Analysis Fees:

- **External (non-UBB) users:** Preliminary evaluation – *free of charge*, 800 RON/sample
- **Internal (UBB) users:** *free of charge*