Biosensing Instrument

Surface Plasmon Resonance label-free analysis system

BI-2500 series

Benchtop SPR with analysis modules

- *Benchtop SPR with 3-channel SPR detection module*
- *High sensitivity to measuring small molecules*
- *Innovative multi-module design for optimal flexibility*
- *Broad response time for slow and fast kinetic processes*
- *Cost-effective solution*

The BI-2500 benchtop SPR system offers a 3-channel flow module and delivers a high-quality binding response for low immobilization and small molecule (<100Da) detection. Its innovative modular design gives users optimal flexibility to choose amongst various analysis modules for life science, electrochemistry, and biosensing in liquid and gas phase SPR applications. In addition, its fast detection is ideal for studying fast kinetics of redox-induced conformational changes in proteins and other biomolecules.

Benefits with 3-channel SPR

The BI-2500 provides greater flexibility and faster assay development, doubling the throughput over 2-channel SPR systems.

Improve data fidelity by obtaining more repeated data sets in one injection

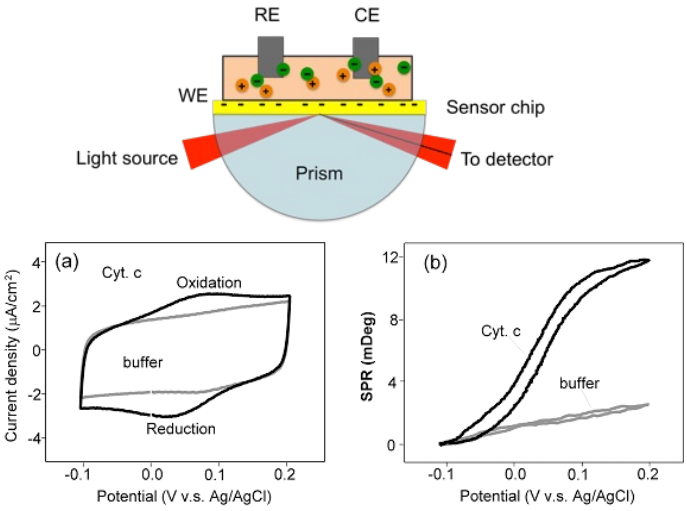
Higher throughput with more channels for binding analysis

Faster assay development by quickly optimizing immobilization and regeneration conditions

Life Science Applications

Redox-Induced Protein Conformational Changes

With the electrochemical-enhanced SPR, redox-induced conformational changes in surface-bound protein molecules such as Cytochrome c can be studied. By controlling the potential of SPR sensor chip, the simultaneously measured SPR angle shows a sigmoidal change as the protein is switched between the oxidized and the reduced states.

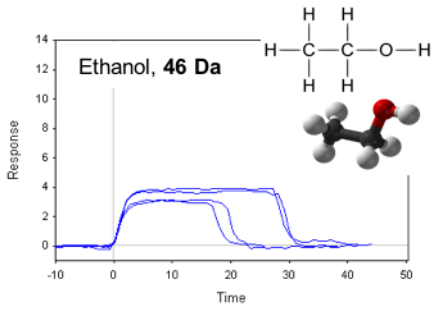


(a) Cyclic voltammogram of cytochrome c, immobilized on a 3-mercaptopropionic acid-functionalized Au SPR sensor chip and (b) the simultaneously recorded SPR angle shift vs. potential. Note that the cyclic voltammogram and SPR response in the absence of cytochrome c are also shown (grey line) for comparison.

Biosensor Applications

Chemical Biosensor Testing with Gas-SPR

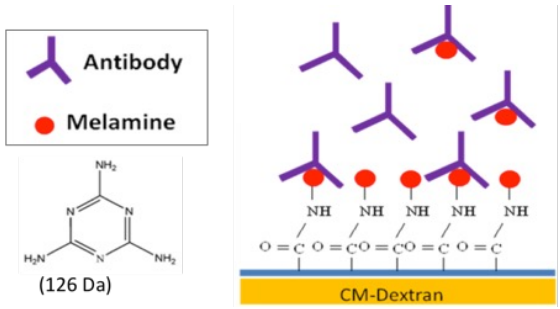
Gas SPR provides superior sensitivity in small molecule detection, which is critical for characterizing polymers and thin films at solid-gas interfaces. Adsorption of the small molecules onto the sensing materials, such as polymers, can be detected by observing SPR angle shift.



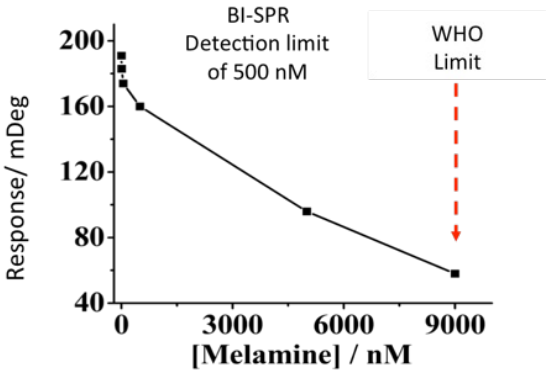
SPR responses of 4 polymerized sensor surfaces exposed to ethanol vapor (46 Da).

Biosensor in Food Safety

Highly sensitive SPR detection has helped to identify illegal alteration of infant milk products with melamine - a small molecule that can boost the detectable protein contents. A competitive binding SPR assay schematic for melamine detection is shown.



The measured SPR response vs. melamine concentration plot for melamine detection in milk has clearly demonstrated the detection limit of the BI instrument (0.5uM) is well below the WHO mandated limit of less than 9uM.



BI-2500 System Specifications:

Base Station	Light source	Two low coherent light sources (670 nm)
	Detection speed	4 ms
	Incident angle ranges	40 - 47 Deg (gas) 67 - 81 Deg (liquid)
	Refractive index ranges	1.00 - 1.40
	Baseline noise	< 0.06 RU RMS (0.01 mDeg RMS)
	Baseline drift	1RU/hr (0.17 mDeg/hr) (when ambient drifts < 1°C/hr)
	Measurement ranges	Association rate ka: up to 10^8 $M^{-1}s^{-1}$ Dissociation rate kd: 10^{-6} to 1 s^{-1} KD: 1pM to 1mM Active Concentration: 1pM to 1mM
	Molecular weight cutoff	100 Da
	Temperate control	Control accuracy at 0.01C Range at +/- 5 C at room temperature
	PC interface	USB 3.0
	Data IO port	IO ports for sending and receiving raw signals with other equipment.
	Outer dimension and weight	355(w) x 250 (h) x 515 (d) mm and 11.5 kg
	Power supply	110-230 V 50/60 Hz
Fluid Handling	Sample channels	3 channels
	Flow cell material	PEEK (biologically compatible)
	Flow rate	1.0 to 150 µL/min (application dependent)
	Buffer handling	Dual syringes driven by programable infusion pump Providing >8 hours of continuing operation.
	Sample injection volume	10 to 500 µL (application dependent)
	Sample injection methods	Manual
	Channel volume	< 32 nL
	Injection rise time	< 0.2 s
	Analysis module (standard)	3 channel Flow Injection Analysis Module
	Optional modules	EC-SPR module for SPR measurement with electrochemistry
		EC-DualFlow™ for two channel flowthrough EC-SPR measurement
		Gas SPR module for chemical vapor SPR measurement
Control System	Computer Software	Windows OS; SPR Control software for real-time instrument control with programmable interaction assays for various application protocols; Data Analysis software for affinity, kinetics analysis.
	Compliance	CE compliance; IQOQ certification

BI-2500 Analysis Modules:

3-channel Flow Injection

Included

EC-SPR

Optional

EC-DualFlow™

Optional

Gas-SPR

Optional

Analysis Modules:

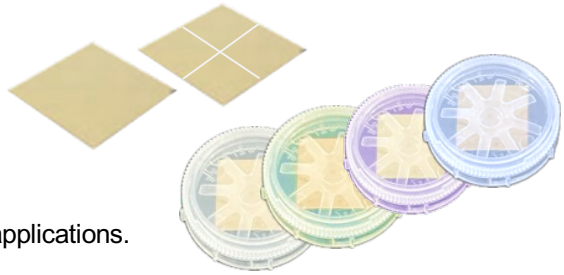
Flow Injection Analysis Module
This 30channel injection module provides continuous flow stream for uninterrupted binding studies.

EC-SPR Analysis Module
This module facilitates simultaneous electrochemical and SPR measurements on the same sensor surface and is ideal for studying various electrochemical processes with SPR and for controlling surface binding and molecular conformational changes via electrochemical control.

EC-DualFlow™ Analysis Module
This module provides users with novel capabilities to study molecular binding processes and conformational changes of biomolecules under the influence of applied electrochemical potentials at different flow rates. Its small channel volume facilitates rapid sample exchange and fast kinetic studies, and also drastically reduces consumption of valuable biological samples.

Gas-SPR Analysis Module
This module enables the high sensitivity of SPR analysis to be performed in the gas phase, permitting new capabilities for sensor development, thin film analysis, environmental and air quality research, and gas molecule binding studies.

Sensor Chips:



Bare Gold Sensor Chip
Highly uniform gold film for reproducible SPR research.

Divided Gold Sensor Chip
Pre-patterned gold surface for SPR with EC-DualFlow™ applications.

CM Dextran Sensor Chip
Sensor with COOH- linker groups in a dextran hydrogel, ideal for high capacity amine coupling with low non-specific absorption.

Streptavidin (SA) Sensor Chip
Sensor with streptavidin in a dextran hydrogel for immobilization of biotinylated molecules such as proteins, peptides, nucleic acids or carbohydrates.

Ni-NTA Sensor Chip
Sensor with NTA used for immobilizing histidine-tagged molecules. NTA surface can be regenerated by injecting EDTA or imidazole.

Protein A Sensor Chip
Sensor with protein A immobilized on carboxymethylated dextran substrate pre-functionalized for affinity capture of a broad range immunoglobulins like total IgG, IgG1, IgG2 and IgG4 from Human, Horse, Rabbit, Goat, Sheep and Mouse.

Other types of sensor chips are available upon request.

Biosensing Instrument

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