

# BI-2500 Series



Benchtop SPR with applications flexibility

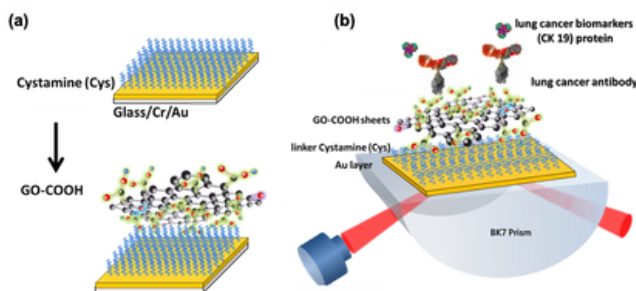


- **Benchtop SPR with 3 channel SPR detection module**
- **High sensitivity to measure small molecules**
- **Innovative multi-module design for optimal flexibility**
- **Broad response time for slow and fast kinetic processes**
- **Cost-effective solution**

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 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.

## Carboxyl-graphene oxide biosensor for lung cancer biomarker detection

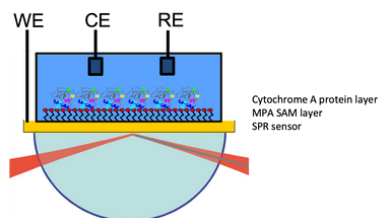
Novel graphene-like sensing materials with carboxyl-functionalized graphene oxide (carboxyl-GO) nanocomposites have excellent biocompatible surfaces and biosensing characteristics. The carboxyl-GO biosensor has shown to have high sensitivity and specificity for the detection of lung cancer cytokeratin 19 biomarker in human plasma.



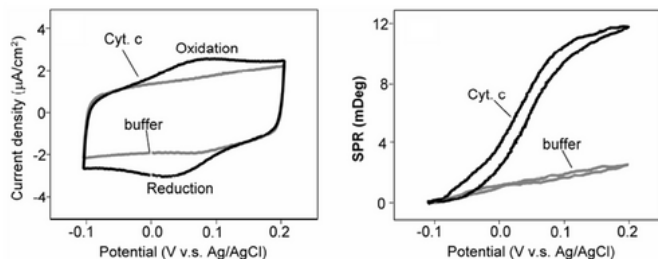
(a) A schematic of carboxyl-GO based SPR biosensors. (b) Immobilization of the biomarker anti-CK19 antibody on the carboxyl-GO-based SPR chip using an immunoassay to detect lung cancer antigen.

Chiu et al. Sens. Actuators. B Chem. 2018, 265, 264-272

## Redox-induced protein conformational changes with EC SPR



Redox reactions in proteins and other molecules are known to cause conformational changes in the proteins. Such conformational changes are often too small to be monitored using structural analysis techniques, but they can be studied using electrochemical SPR.

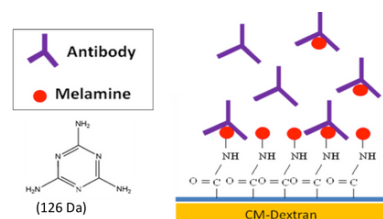


Left, cyclic voltammogram of cytochrome c, immobilized on a 3-mercaptopropionic acid-functionalized Au SPR sensor chip. Right, the simultaneously recorded SPR angle shift vs. potential.

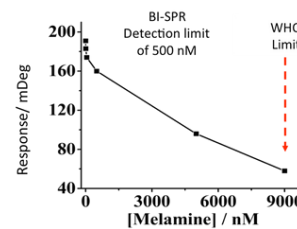
Boussaad et al. Anal. Chem. 2000, 72, 222-226

## 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.

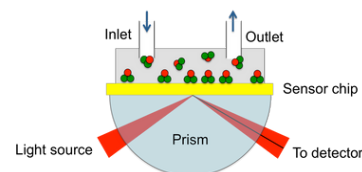


The measured SPR response vs. melamine concentration plot for melamine detection in milk has clearly demonstrated the detection limit of the BI instrument (0.5µM) is well below the WHO mandated limit of less than 9µM.

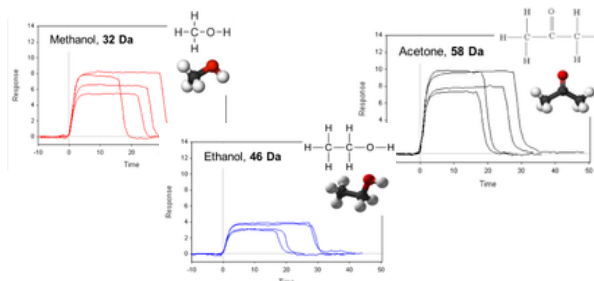


## Chemical biosensor testing with gas SPR

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.



The effect of three gases (Ethanol, Methanol and Acetone) were studied on four different sensing surfaces, resulting in quantitative characterization of the sensing polymers used for the gas sensors development.



# BI-2500 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 constant $k_a$ : up to $10^8 \text{ M}^{-1}\text{s}^{-1}$ Dissociation rate constant $k_d$ : $10^{-6}$ to $1 \text{ s}^{-1}$ KD: pM to mM
	Molecular weight cutoff	100 Da
	Temperature control	Range: +/- 5 degrees at room temperature Control accuracy: 0.01 °C
	PC interface	USB 3.0
	Data IO port	IO ports for sending and receiving raw signals with other equipment
	Outer dimension	355(w) x 215 (h) x 365 (d) mm
	Weight	8 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 $\mu\text{L}/\text{min}$ (application dependent)
	Buffer handling	Dual syringes driven by programmable infusion pump. Provides >8 hours of continuing operation.
	Sample injection volume	10 to 500 $\mu\text{L}$ (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 and kinetics analysis.
Compliance		CE IQOQ certification

## Benefits of a 3 channel SPR

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



Improves data fidelity by obtaining more data in one injection



High productivity with different ligands in each channel



Cost effective by quickly optimizing immobilization and regeneration conditions

## 2500 analysis modules



Included

**Flow Injection**  
Provides continuous flow stream for uninterrupted binding studies



Optional

**EC-DualFlow™**  
EC combined SPR measurements under the influence of applied electrochemical potentials at different flow rates



Optional

**EC SPR**  
Facilitates simultaneous electrochemical and SPR measurements on the same sensor surface



Optional

**Gas SPR**  
Enables the high sensitivity of SPR analysis to be performed in the gas phase

## Sensor chips

### 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.

### Dextran Sensor Chip

Sensor carboxymethylated dextran hydrogel covalently attached via carboxyl groups to a self-assembled monolayer on gold surface. Ideal for high capacity amine coupling with low non-specific absorption.

### Streptavidin (SA) Sensor Chip

Streptavidin covalently attached to a carboxymethyl dextran matrix for immobilization of biotinylated analytes such as proteins, peptides, nucleic acids or carbohydrates.

### Ni-NTA Sensor Chip

Carboxymethylated dextran hydrogel with Ni<sup>2+</sup>/NTA chelation. 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.

### L1 Sensor Chip

Carboxymethylated dextran hydrogel, partially alkyl derivatized. For immobilization of liposomes and vesicles.

