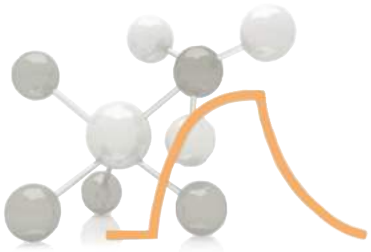
Biosensing Instrument

Surface Plasmon Resonance
Label-Free Analysis System

BI-4500 Series

5 channel SPR with modular design for applications flexibility



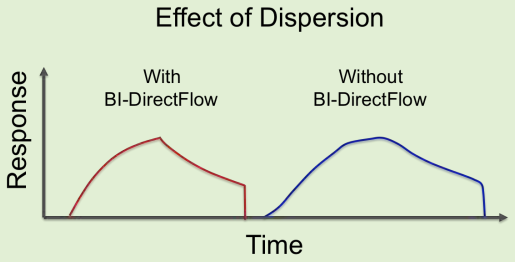
2016 R&D 100 WINNER

- ✧ **High throughput with 5 channels and fully automated sampling**
- ✧ **High sensitivity to measure small molecules**
- ✧ **Precise sample delivery with BI-DirectFlow™ technology**
- ✧ **Innovative multi-module design for optimal flexibility**
- ✧ **Cost effective solution**

The new BI-4500 SPR system provides multiple channel flow modes and delivers high quality binding response for low immobilization and small molecule (<100 Da) detection. Equiped with BI-DirectFlow™ technology, the BI-4500 system integrates precision sample delivery with near-zero dispersion for fast kinetics and effective removal of various secondary effects. Its modular innovative design gives users with optimal flexibility to choose amongst various analysis modules for life science, electrochemistry, and sensing in liquid and gas phase SPR applications.

Precise sample delivery with BI-DirectFlow™

BI-DirectFlow™ technology delivers sample to the sensor surface with near-zero dispersion generating high quality data that more clearly distinguishes true binding events from the secondary effects.

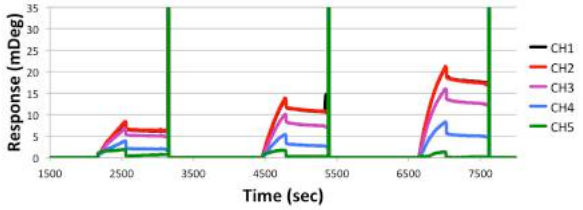


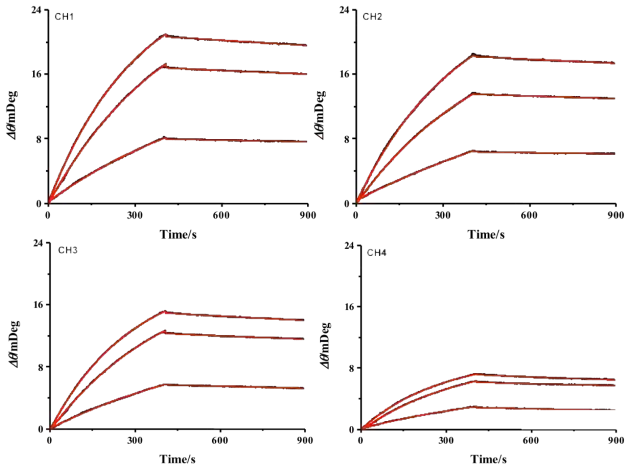
The binding response on the left (without dispersion) has very sharp, well-defined binding analysis regions and generates more accurate and reproducible results. The binding response on the right (with dispersion) has blurred, poorly defined binding analysis regions.

Life Science Applications

Binding Kinetics Analysis

Interaction between Bovine Serum Albumin (BSA) and Anti-BSA can be monitored in real-time by using the flow injection SPR analysis module.



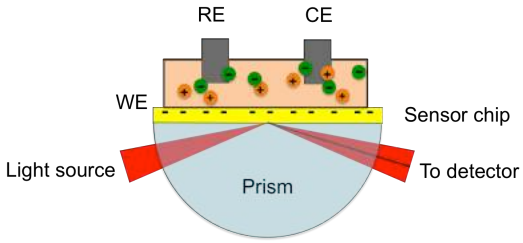


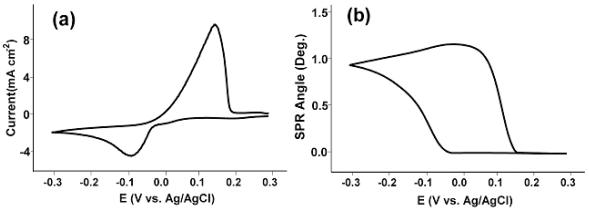
Reference subtracted binding curves of four channels at varying analyte concentrations with kinetic analysis fits showing an associate rate constant ka=8.6×10^4±0.5 $M^{-1}s^{-1}$, dissociation rate constant kd=1.5 × 10^{-4} s^{-1} ± 0.25, and affinity binding constant KD=1.7 nM ± 0.2

Material Science Applications

Metal Deposition/Stripping in EC SPR

Using EC SPR to quantify the amount of metal electrodeposited onto a surface, the thicknesses of the copper film can be determined within sub-angstrom precision. The ability of EC SPR to determine tiny thickness variations down to sub-angstrom level demonstrates its superb sensitivity.





EC SPR study of 5 mM $CuSO_4$/0.1 M H_2SO_4 solution: (a) cyclic voltamagram showing copper redox peaks (b) simultaneous SPR response confirming copper film deposition and stripping corresponding to the redox potentials.

4500 System Specifications

Base Station	Light source	670 nm
	Detection speed	4 ms
	Incident angles	40-47 Deg (gas) 67-81 Deg (liquid)
	Baseline noise	< 0.06 RU RMS (0.01 mDeg RMS)
	Baseline drift	0.30 RU/hr (0.05 mDeg/hr) (when ambient drifts < 1°C/hr)
	Temperature Control Range	6°C to 50°C (10°C below ambient temperature max)
	Outer dimension	355(w) x 250 (h) x 515 (d) mm
	Weight	11.5 kg
	Power supply	110-230 V 50/60 Hz
Fluid Handling	Number of sample flow channels	5 channels
	Flow cell material	PEEK (biologically compatible)
	Flow rate	1.0 to 250 µL/min (application dependent)
	Sample injection volume	>50 µL (application dependent)
	Sample injection methods	Fully automated (Autosampler option) Semi-automated
	Kinetic constant	k_a <1 X 10^8 $M^{-1}s^{-1}$ k_d >1 X 10^{-6} s^{-1}
	Dissociation constant	K_D = 10^{-3} M (1 mM) to 10^{-12} M (1 pM)
	Molecular weight cutoff	100 Da
Control System	Computer	Windows operating system
	Software	BI-SPR software including Data Analysis and Kinetics Analysis packages
Autosampler (option)	Sample capacity	2 x SBS standards (384 / 96), 2 x 48 Vials (1.5mL), 2 x 12 Vials (10mL)
	Sample cooling	Minimum: 4°C +/- 2°C
	Outer dimension	300 (w) x 575 (h) x 360 (d) mm
	Weight	21 kg
Automatic Buffer Exchange Pump and Degasser (option)	Buffer exchange	Automatic buffer exchange up to six sources
	Buffer degasser	In-line
	Buffer delivery	Continuous
	Outer dimension	305 (w) x 191 (h) x 330 (d) mm
	Weight	6.8 kg

Analysis Modules

BI-DirectFlow™

This module enables precise flow control technology that delivers sample to the sensor surface with near-zero dispersion, enabling the study of SPR events in greater detail than ever before.

EC-DualFlow™

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.

EC SPR

This module facilitates simultaneous electrochemical and SPR measurements on the same sensor chip, and is ideal for studying various electrochemical processes with SPR.

Gas SPR

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, and gas molecule binding studies.

BI-DirectFlow™ — Included

EC-DualFlow™ — Optional

EC SPR — Optional

Gas SPR — Optional

Sensor Chips

Bare Gold Sensor Chip

Highly uniform gold film for reproducible SPR research.

Divided Gold Sensor Chip

Pre-patterned gold surface for EC flow SPR 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 Chip

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

Bi Biosensing Instrument

QR for Website

Email: Info2BI@BiosensingUSA.com

Website: www.BiosensingUSA.com

Tel: 1-480-491-2777 Fax: 1-866-897-8741