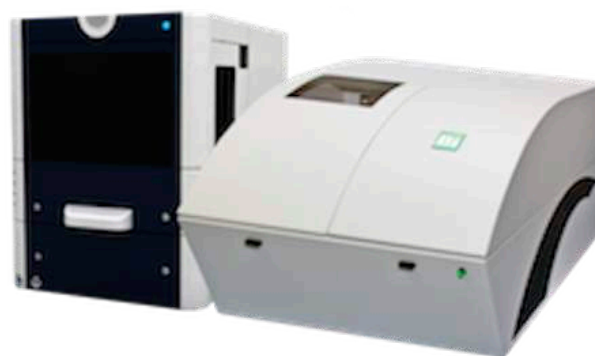
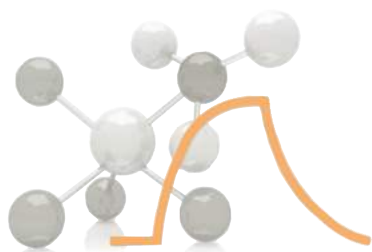


BI-4500 Series

With analysis modules
and autosampler option

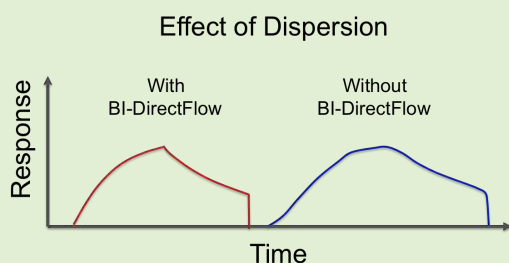


- ✧ **High throughput with 5 channels and fully automated sampling**
- ✧ **High sensitivity to measure small molecules**
- ✧ **Precise sample delivery with BI-DirectFlow™ technology**
- ✧ **Innovative multi-module design for optimal flexibility**
- ✧ **Cost effective solution**

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. Equipped 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.

Material Science Applications

Metal Deposition/Stripping in EC SPR

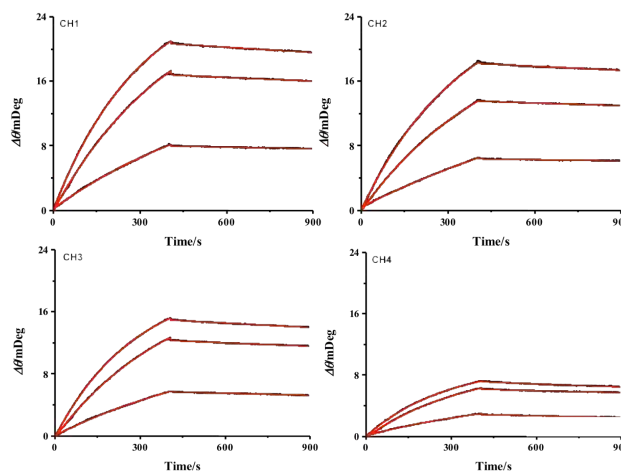
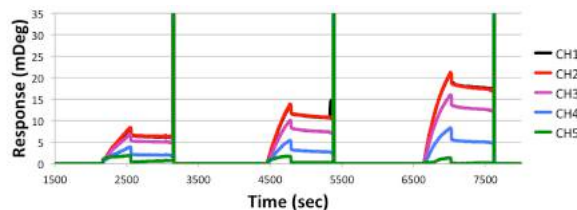
Using EC SPR to quantify the amount of metal electrodeposited onto a surface, the thicknesses of the copper film can be determined within sub-angstrom precision. The ability of EC SPR to determine tiny thickness variations down to sub-angstrom level demonstrates its superb sensitivity.

EC SPR study of 5 mM CuSO₄/0.1 M H₂SO₄ solution: (a) cyclic voltamogram showing copper redox peaks (b) simultaneous SPR response confirming copper film deposition and stripping corresponding to the redox potentials.

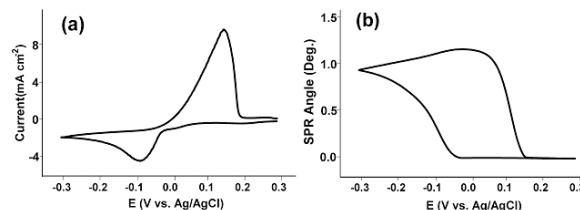
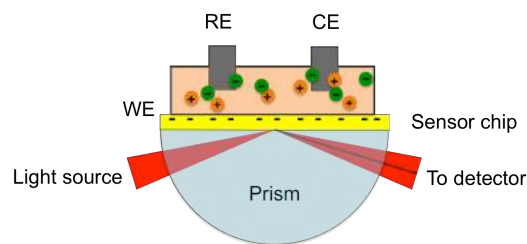
Life Science Applications

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 $k_a = 8.6 \times 10^4 \pm 0.5 \text{ M}^{-1}\text{s}^{-1}$, a dissociate rate constant $k_d = 1.5 \times 10^{-4} \text{ s}^{-1} \pm 0.25$, and affinity binding constant $K_D = 1.7 \text{ nM} \pm 0.2$



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)
	PC interface	USB 3.0
	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
	Channel volume	< 32 nL
	Injection rise time	< 0.2 s
	Kinetic constant	$k_a < 1 \times 10^8 \text{ M}^{-1}\text{s}^{-1}$ $k_d > 1 \times 10^{-6} \text{ s}^{-1}$
	Dissociation constant	$K_D = 10^{-3} \text{ M (1 mM) to } 10^{-12} \text{ M (1 pM)}$
	Molecular weight cutoff	100 Da
Analysis module	5 channel BI-DirectFlow™ Module	
Control System	Computer	Windows operating system
	Software	BI-SPR software including Data Analysis and Kinetics Analysis packages

4500 Analysis Modules



BI-DirectFlow™

Included



EC-DualFlow™

Optional



EC SPR

Optional



Gas SPR

Optional

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™

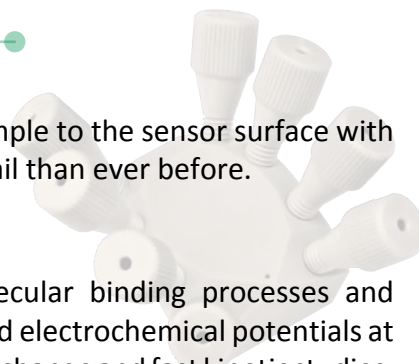
This module provides users with novel capabilities to study molecular binding processes and conformational changes of biomolecules under the influence of applied electrochemical potentials at different flow rates. Its small channel volume facilitates rapid sample exchange and fast kinetic studies, and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

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 and for controlling surface binding and molecular conformational changes via electrochemical means.

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



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