



Protein Interaction Analysis

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ProteOn™ XPR36 Protein Interaction Array System

See Also

Proflin protein purification system: pages 92–93.

Experion automated electrophoresis system: pages 112–116.

The ProteOn XPR36 protein interaction array system is an SPR optical biosensor that provides real-time data on the affinity, specificity, and interaction kinetics of protein interactions. Using proprietary XPR™ technology, a unique approach to multiplexing, this system generates a 6 x 6 interaction array for the simultaneous analysis of up to six targets with up to six analytes. User-friendly ProteOn Manager™ software uses a flexible, guided approach to coordinate instrument control, experiment setup, and data analysis.



Key Features and Benefits

- Analysis of up to 36 different protein interactions in a single run, on a single chip
- Complete kinetic analysis in a single run
- Full kinetic data in a single run using our patented One-shot Kinetics™ method
- Ability to simultaneously measure a variety of experimental conditions in parallel
- Ability to screen multiple panels of analytes
- Automated system with real-time data acquisition

- Analysis of interaction kinetics, binding affinity, and analyte concentration
- No radiochemical or fluorescent labels needed
- Unique referencing options such as interspot and real-time double referencing

Applications

- Large and small molecule drug development
- Antibody characterization
- Epitope binning of up to 36 antibodies on a single chip

For More Information

Web: www.bio-rad.com/proteon

Request or download bulletins: 5390 and 5538

Instrument

ProteOn™ XPR36 Instrument

Order Info: Pg 252

The ProteOn XPR36 instrument incorporates the microfluidics, optical detection, and temperature control systems that are required for interaction analysis. It integrates a high-efficiency crisscross microfluidic system with a highly sensitive optical system to generate interaction array data on up to six targets with up to six analytes in a single injection. ProteOn XPR36 instrument features include:

- Advanced optics and interspot referencing
- Innovative microfluidics design
- Flexible sample configuration (72 vials with pierceable caps or two 96-well standard or deep-well microplates)
- A temperature-controlled sensor surface (15–40°C) and cooled sample rack (2–35°C)
- Hardware and software control of the fluidics, including two 2 L buffer reservoirs
- Status LEDs to monitor instrument, chip, experiment, and temperature state
- Bar code recognition of sensor chips

Advanced Optics and Interspot Referencing

The ProteOn XPR36 protein interaction array system uses imaging technology to detect the SPR response for each spot on a sensor chip. The ProteOn XPR36 system measures a total of 78 spots: 36 spots represent the interaction data from the 6 x 6 array, and 42 interspot references can be used for reference subtraction.

Innovative Fluidics and Parallel Processing

The 6 x 6 interaction array and microfluidic system provide efficient parallel processing of multiple samples. Two sets of six 0.5 ml syringe pumps operate in unison for parallel aspiration and injection of six samples or reagents.

Bar Code Recognition

Bar codes provide automatic recognition of sensor chip type, expiration date, and lot number, as well as a usage record that includes associated protocols and experiments.

For More Information

Web: www.bio-rad.com/proteon

Request or download bulletin: 5413

Software

ProteOn Manager™ Software

Order Info: Pg 252

ProteOn Manager software is an intuitive workflow-oriented software package that coordinates instrument control, experiment setup, and data collection and analysis.

Key Features

- Windows 7 and Windows XP validated software
- Control and monitoring of instrument communication, temperature, power status, chip docking and undocking, instrument fluidics, and autosampler illumination
- Automated protocol creation and application-based protocol templates
- Real-time data collection and display
- Color coded sample layout, data filtering, and grouping tools
- Reference subtraction and real-time double reference modes to ensure highest quality data
- Langmuir, Langmuir with mass transfer, bivalent analyte, heterogeneous analyte, heterogeneous ligand, two state, Langmuir with drift, and off-rate analysis models
- Easily review protocols using Protocol Check screen
- 3 analysis options: kinetics, equilibrium, and concentration
- Customizable analysis reports — include sensorgrams; equilibrium and concentration analysis graphs; residuals to evaluate accuracy of data fitting; kinetic, equilibrium, and concentration constants determination
- Sensorgram data can be exported as data or as an image for presentations and reports
- Control over sensorgram line color and thickness for publication-quality data



For More Information

Web: www.bio-rad.com/proteonsoftware

Request or download bulletin: 5627

Regulatory Tools

ProteOn™ XPR36 System Regulatory Tools Package

Order Info: Pg 252

ProteOn Manager™ Software, Security Edition

ProteOn Manager software is available with controls to help achieve U.S. FDA 21 CFR Part 11 compliance. Included in the many features of this Security Edition release are:

- Audit trails
- Electronic signatures
- Data validation
- User log-ins and permissions
- Closed-system security

ProteOn XPR36 Installation Qualification/Operation Qualification (IQ/OQ) Kit

The ProteOn XPR36 IQ/OQ kit has been designed to test critical system functions to ensure reliability and consistency of performance. Key features include:

- Wizard-driven software
- Printable electronic reports for document controls
- Electronic log of IQ/OQ and test results
- Ready-to-use reagents and sensor chip for testing system performance
- Unattended operation



For More Information

Web: www.bio-rad.com/proteonregulatorytools

Request or download bulletins: 5409, 5627, and 5819

Sensor Chips

ProteOn™ Sensor Chips

Order Info: Pg 252

ProteOn GLC Sensor Chip

Designed for general amine coupling, this chip has a compact polymer layer with a binding capacity of approximately one protein monolayer. The GLC sensor chip is suitable for various research applications, including protein-protein interaction analysis.



ProteOn GLM Sensor Chip

Designed for general amine coupling and featuring an extended polymer matrix with intermediate binding capacity for high analyte response, this chip is suitable for many applications, including protein-small molecule and protein-protein interaction analyses.

one protein monolayer. This chip is suitable for many applications, including DNA-protein and protein-protein interaction analyses.

ProteOn GLH Sensor Chip

Designed for general amine coupling, this chip consists of a highly extended, mixed polymer layer for maximum binding capacity. It is optimal for protein-small molecule interactions and suitable for protein-protein interactions where highest sensitivity is of primary concern.

ProteOn Polyhistidine-Tag Sensor Chips

ProteOn polyhistidine-tag sensor chips contain novel Tris-NTA complexes for improved capture of polyhistidine-tagged proteins. The complexes are attached to an alginate matrix layer.

ProteOn NLC Sensor Chip

This chip features NeutrAvidin protein immobilized to a GLC polymer layer for binding of biotinylated molecules. The binding capacity is approximately

- **ProteOn HTG sensor chip** — lower Tris-NTA surface density and less nonspecific binding, most suitable for protein-protein, protein-peptide, and protein-DNA interaction analyses
- **NEW ProteOn HTE sensor chip** — elevated Tris-NTA surface density optimal for protein-small molecule interaction analysis

For More Information

Web: www.bio-rad.com/sensorchips

Request or download bulletins: 5404 and 5409

Kits, Reagents, and Consumables

ProteOn™ Protocol Development Kits

Order Info: Pg 252

ProteOn protocol development kits provide the reagents and sensor chips needed to perform and analyze data from a complete experiment using the ProteOn XPR36 system. Each protocol development kit includes an amine coupling kit.

ProteOn™ One-shot Kinetics™ Kit

The interaction between the cytokine IL-2 and an IL-2 antibody demonstrates a detailed kinetic analysis in a single injection cycle (One-shot Kinetics). The kit also demonstrates a useful method for controlling target immobilization levels during protocol development and optimization.



ProteOn Multiple Protein Interaction Kit

ProteOn Multiple Protein Interaction Kit

The interaction between five mutant TEM1 β -lactamase proteins and wild-type β -lactamase inhibitor protein (BLIP) demonstrates the power of the ProteOn XPR36 system to produce a detailed kinetic analysis of multiple simultaneous interactions and to map protein interfaces.

ProteOn Protein-Small Molecule Kit

The interaction between the carbonic anhydrase II protein and the small molecule 4-carboxy benzene sulfonamide (4-CBS) demonstrates the capability of the ProteOn XPR36 system to detect low molecular weight analytes.

For More Information

Web: www.bio-rad.com/proteonkits

Request or download bulletins: 5409 and 5410

ProteOn™ Kits and Reagents

Order Info: Pg 253

ProteOn HTG and HTE Reagent Kit

The ProteOn HTG and HTE reagent kit includes 10 mM NiSO₄ and 300 mM EDTA and is designed for easy activation and regeneration of the ProteOn HTG and HTE sensor chips; contains sufficient reagents for more than 80 cycles.

ProteOn Amine Coupling Kit

Provides the reagents required for coupling targets that have amine groups (for example, proteins and nucleic acids) to surface carboxyl groups of ProteOn GLC, GLM, and GLH sensor chips. Ethanolamine HCl solution is included for deactivation of residual active sites. Sufficient reagents are provided for 60 moderate or up to 600 light activations.

ProteOn Immobilization Buffers

ProteOn immobilization buffers are designed to dilute protein samples for coupling to ProteOn sensor chips. Each buffer is sufficient for 100 ligand immobilizations.

ProteOn Regeneration and Conditioning Kit

ProteOn regeneration buffers are available as a complete kit of nine solutions or individually. They include glycine buffers, SDS, sodium hydroxide, hydrochloric acid, phosphoric acid, and sodium chloride.



ProteOn Maintenance Kit

The ProteOn maintenance kit contains solutions and chips for post-experiment and weekly maintenance and cleaning of the ProteOn XPR36 protein interaction array system.

ProteOn Running Buffers

ProteOn running buffers are prefiltered and sufficient for approximately 2 weeks of daily operation.

ProteOn Chip Normalization Solution

ProteOn chip normalization solution is a 50% glycerol solution used for normalization of ProteOn sensor chip surfaces. It is sufficient for 6 months of daily use.

For More Information

Web: www.bio-rad.com/proteonkits

Request or download bulletin: 5409

ProteOn™ Vials, Microplates, and Sealing Film

Order Info: Pg 253

ProteOn Sample Vials

Compatible with the ProteOn sample rack, each 1.5 ml vial includes a pierceable cap to prevent evaporation.

ProteOn Standard Microplates

Compatible with the ProteOn autosampler platform, each microplate is a standard 96-well array, and each well holds 350 µl.

ProteOn Deep-Well Microplates

Compatible with the ProteOn autosampler platform, each microplate is a standard 96-well array, and each well holds 2.0 ml.

ProteOn Microplate Sealing Film

Specifically designed for use with the fluidic components of the ProteOn instrument, the film is required for covering ProteOn standard and deep-well microplates to prevent evaporation while running a protocol or during storage. It is easily applied to each microplate and is pierceable.



ProteOn Sample Vials



ProteOn Standard Microplates



ProteOn Deep-Well Microplates



ProteOn Microplate Sealing Film

For More Information

Web: www.bio-rad.com/proteonkits

Request or download bulletin: 5409

ProteOn XPR36 Protein Interaction Array System

Instrument

Catalog # Description

ProteOn XPR36 Instrument Pg 248

176-0100 **ProteOn XPR36 Protein Interaction Array System**, 100–240 V, includes ProteOn XPR36 instrument, 2 licensed copies of ProteOn Manager software, controller and display, communication cable, sample rack, rack needle set, microplate needle set, collection tank, choice of 2 sensor chips, One-shot Kinetics kit, maintenance kit, 2 bottles of PBS/Tween running buffer, chip normalization solution, 100 sample vials, 25 microplates with standard wells, 50 sheets of microplate sealing film, instruction manual

Accessories*

176-4114 **ProteOn Buffer Inlet Filters**, 2
 176-6000 **ProteOn Sample Rack**, holds 72 sample vials
 176-6003 **ProteOn Needles**, 6
 176-6004 **ProteOn Wash Station**
 176-6061 **ProteOn Collection Tank Tubing**
 176-6005 **ProteOn Syringe**, replacement, 1
 176-6050 **ProteOn Syringe**, replacement, 6

* For additional accessories, go to www.bio-rad.com/proteininteraction.

Software

ProteOn Manager Software Pg 249

176-0200 **ProteOn Manager Software**, 1-user license, includes 1 HASP key
 176-0210 **ProteOn Manager Software, Security Edition**, allows U.S. FDA 21 CFR Part 11 compliance, 1-user license, includes 1 HASP key

Regulatory Tools

ProteOn XPR36 System Regulatory Tools Package Pg 249

176-4225 **ProteOn XPR36 Regulatory Tools Package**, includes ProteOn Manager software, Security Edition, 1-user license, includes 1 HASP key, ProteOn XPR36 IQ/OQ kit
 176-0210 **ProteOn Manager Software, Security Edition**, allows U.S. FDA 21 CFR Part 11 compliance, 1-user license, includes 1 HASP key
 176-4200 **ProteOn XPR36 IQ/OQ Kit**, includes ProteOn XPR36 IQ/OQ software, ProteOn operation qualification (OQ) kit
 176-4220 **ProteOn Operation Qualification Kit**, includes ProteOn OQ Kit 1, ProteOn OQ Kit 2, ProteOn GLC sensor chip

Sensor Chips

ProteOn Sensor Chips Pg 250

176-5011 **ProteOn GLC Sensor Chip**, for general amine coupling, compact polymer layer with binding capacity of approximately one protein monolayer
 176-5012 **ProteOn GLM Sensor Chip**, for general amine coupling, polymer matrix layer with intermediate binding capacity
 176-5013 **ProteOn GLH Sensor Chip**, for general amine coupling, polymer matrix layer with highest binding capacity
 176-5021 **ProteOn NLC Sensor Chip**, for binding of biotinylated molecules, contains NeutrAvidin immobilized to GLC layer
 176-5031 **ProteOn HTG Sensor Chip**, for capturing of polyhistidine-tagged proteins, suitable for protein-protein and protein-peptide interaction analyses
 176-5033 **ProteOn HTE Sensor Chip**, for capturing of polyhistidine-tagged proteins, optimal for protein–small molecule interaction analysis

Kits, Reagents, and Consumables

ProteOn Protocol Development Kits Pg 250

176-1010 **ProteOn One-Shot Kinetics Kit**, includes ProteOn IL-2/IL-2 antibody pair, GLC sensor chip, amine coupling kit, 50 ml sodium acetate buffer, pH 4.5
 176-1020 **ProteOn Multiple Protein Interaction Kit**, includes ProteOn TEM1/BLIP protein set, GLC sensor chip, amine coupling kit, 50 ml sodium acetate buffer, pH 4.0
 176-1030 **ProteOn Protein–Small Molecule Kit**, includes ProteOn carbonic anhydrase II/CBS pair, GLM sensor chip, amine coupling kit, 50 ml sodium acetate buffer, pH 5.0

Catalog # Description

ProteOn Kits and Reagents

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ProteOn Coupling Kits and Neutralization Reagent

176-2500	ProteOn HTG Capturing Kit , includes 1 HTG sensor chip, 1 ProteOn HTG and HTE reagent kit
176-2600	ProteOn HTE Capturing Kit , includes 1 HTE sensor chip, 1 ProteOn HTG and HTE reagent kit
176-2510	ProteOn HTG and HTE Reagent Kit , includes 10 mM NiSO ₄ , 300 mM EDTA
176-2410	ProteOn Amine Coupling Kit , includes EDAC (EDC), sulfo-NHS, ethanalamine HCl
176-2450	ProteOn Ethanalamine HCl , 1 M, 40 ml

ProteOn Immobilization Buffer Kit and Components

176-2110	ProteOn Immobilization Buffer Kit , includes one of each sodium acetate buffer (pH 4.0, 4.5, 5.0, 5.5)
176-2120	ProteOn Acetate Buffer, pH 4.0 , 10 mM sodium acetate, 50 ml
176-2121	ProteOn Acetate Buffer, pH 4.5 , 10 mM sodium acetate, 50 ml
176-2122	ProteOn Acetate Buffer, pH 5.0 , 10 mM sodium acetate, 50 ml
176-2123	ProteOn Acetate Buffer, pH 5.5 , 10 mM sodium acetate, 50 ml

ProteOn Regeneration Kit and Components

176-2210	ProteOn Regeneration and Conditioning Kit , includes one of each glycine buffer (pH 1.5, 2.0, 2.5, 3.0), sodium hydroxide solution, SDS solution, hydrochloric acid solution, phosphoric acid solution, sodium chloride solution, 50 ml each
176-2220	ProteOn Glycine Buffer, pH 1.5 , 10 mM glycine HCl, 50 ml
176-2221	ProteOn Glycine Buffer, pH 2.0 , 10 mM glycine HCl, 50 ml
176-2222	ProteOn Glycine Buffer, pH 2.5 , 10 mM glycine HCl, 50 ml
176-2223	ProteOn Glycine Buffer, pH 3.0 , 10 mM glycine HCl, 50 ml
176-2230	ProteOn Sodium Hydroxide Solution , 50 mM, 50 ml
176-2240	ProteOn SDS Solution , 0.5%, 50 ml
176-2250	ProteOn Hydrochloric Acid Solution , 100 mM, 50 ml
176-2260	ProteOn Phosphoric Acid Solution , 0.85%, 50 ml
176-2270	ProteOn Sodium Chloride Solution , 1 M, 50 ml

ProteOn Maintenance Kit and Components

176-4300	ProteOn Maintenance Kit , includes 1 maintenance chip, 2 cleaning chips, 2 maintenance solutions (2 x 1 L 2% Contrad 70, 2 x 1 L 70% IPA)
176-4115	ProteOn Maintenance Solution 1 , 2% Contrad 70, 2 x 1 L bottles
176-4116	ProteOn Maintenance Solution 2 , 70% IPA, 2 x 1 L bottles
176-4117	ProteOn Post-Experiment Clean Kit , includes 2 cleaning solutions (50 ml 2% Contrad 70, 50 ml 20 mM HCl)
176-4118	ProteOn Post-Experiment Clean Kit Solution 1 , 2% Contrad 70, 50 ml
176-4119	ProteOn Post-Experiment Clean Kit Solution 2 , 20 mM HCl, 50 ml
176-2520	ProteOn Maintenance and Post-Experiment Clean Kit , includes 1 maintenance chip, 2 cleaning chips, 2 maintenance solutions (2 x 1 L 2% Contrad 70, 2 x 1 L 70% IPA), 2 cleaning solutions (50 ml 2% Contrad 70, 50 ml 20 mM HCl)
176-5100	ProteOn MNT Maintenance Chip , for use in instrument maintenance protocol
176-5110	ProteOn CLN Cleaning Chip , for use in microfluidics network cleaning protocol

ProteOn Running Buffers, Buffer Bottle, and Chip Normalization Solution

176-2710	ProteOn PBS , phosphate buffered saline, pH 7.4, 2 L
176-2720	ProteOn PBS/Tween , phosphate buffered saline, pH 7.4, 0.005% Tween 20, 2 L
176-2730	ProteOn PBS/Tween/EDTA , phosphate buffered saline, pH 7.4, 0.005% Tween 20, 3 mM EDTA, 2 L
176-2700	ProteOn Running Buffer Bottle , 2 L capacity
176-2810	ProteOn Chip Normalization Solution , 50% glycerol, 100 ml

ProteOn Vials, Microplates, and Sealing Film

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176-6010	ProteOn Sample Vials , 1.5 ml, with pierceable caps, 100
176-6020	ProteOn Standard Microplates , 96 wells, 25
176-6023	ProteOn Deep-Well Microplates , 96 wells, 5
176-6040	ProteOn Microplate Sealing Film , 50 sheets

