



Perfect Separation Solutions



**(Bio)SECcurity<sup>2</sup>**

GPC/SEC, IPC and 2D Systems and Solutions

# About PSS

## Perfect Separation Solutions

PSS GmbH was founded in 1985 by two PhD students at the Physical Chemistry Department, University of Mainz, Germany, producing polymer standards at the University facilities. In the following years PSS expanded staff and products to include tailor-made polymers, organic and aqueous GPC/SEC columns and GPC/SEC software. In 2001, PSS moved into own facilities located in Mainz, Germany. PSS-USA opened its office in 1994, servicing North and South American customers from Amherst, Massachusetts. To date, PSS has successfully gained leadership in the GPC/SEC market, making innovative contributions not only in Germany and the USA, but around the world.

PSS is fully dedicated to the advancement of macromolecular liquid chromatography, by means of materials design, synthesis, manufacturing, consulting, service and innovative research, applying the highest standards of expertise and reliability. Our close relationship with our customers has helped us to continuously improve the quality of our products and services.

Our high caliber staff, mostly chemists, is experienced, creative and trained in problem solving. Corporations, universities and organizations in more than 60 countries use our products and profit from our outstanding service and know-how.

## Certified DIN ISO EN 9001

PSS is certified (DIN ISO EN 9001:2008) to produce high quality reference polymers, GPC/SEC columns and software for the characterization of polymers by their molecular weight and their structural characteristics. PSS utilizes the latest discoveries in macromolecular science for the synthesis and characterization of polymers, copolymers and biopolymers. PSS operates a manufacturing facility equipped with a complete state-of-the-art characterization laboratory at the headquarters in Mainz, Germany, fully supporting customers working under stringent requirements i.e., GLP, DIN, ISO certifications.

**We take care of your analytical challenges in  
Liquid Chromatography of (Bio)Polymers, Proteins and Particles.**

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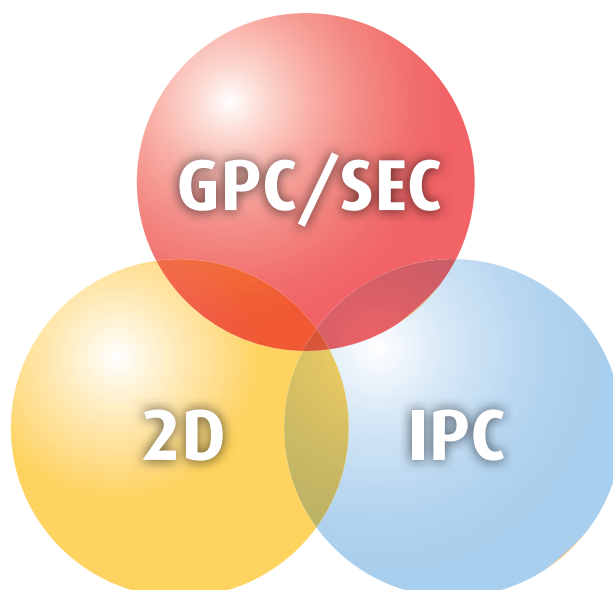
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# One-stop GPC/SEC, IPC and 2D Systems and Solutions



**Macromolecules are everywhere – and we understand macromolecules. The use of liquid chromatography (LC) allows for the comprehensive characterization of macromolecules regarding their distributions (molar mass, composition, end groups, etc.) as well as the determination of processing agents.**



Besides GPC/SEC/GFC, the most commonly used separation technique, Interaction Polymer Chromatography (IPC) is used to separate (bio)polymers and protein. Hyphenation with advanced detection allows comprehensive characterization not only with respect to molar mass.

## **(Bio)SECcurity<sup>2</sup>**

Reliability, robustness and ease-of-use - these are the key requirements for LC instruments in every laboratory. In addition, Research & Development require flexibility and scalability in order to be able to respond to the changing separation and detection needs in a timely and cost-effective manner.

The modular (Bio)SECcurity<sup>2</sup> LC System is the standard for successful analysis with GPC/SEC, IPC and hyphenated techniques. Its robustness, reliability and ease of use are the benchmark of industry and academia.

- **Advanced technology and high performance components** ensure robustness and provide reliable automation options. Of course, all components of the system are designed to operate with all GPC/SEC typical solvents including HFIP.
- Intelligent, lab-proven approaches guarantee a **maximum of safety and ease of use**. We provide solutions for even the most demanding applications.
- **Flexible design** and **upgradeability** in respect to all aspects of the system ensure a secure initial investment that is guaranteed future proof.
- Integrated logbooks and meaningful tests as well as modern communication paths facilitate **validation** of individual components and the complete system.
- Up to date communication via LAN allows flexible and secure access. The RC.Net driver approach ensures easy **integration into laboratory IT solutions**. Full software instrument control is possible for PSS WinGPC and for other Chromatography Data Systems (CDS) such as EZChrom, ChemStation, Empower or Chromeleon.

## Turn-key Solutions

PSS will implement the perfect (Bio)SECcurity<sup>2</sup> system according to your requirements. We combine the ideal hardware components with our Macromolecular Chromatography Data System (MCDS), our high-resolution polymer- or silica-based columns and our high-quality reference materials for calibration and validation to create a powerful turn-key solution. In addition to our instrument and software experts, our analysts in the contract analysis department and the production department provide support for column selection, method development, method validation and -transfer.

Comprehensive service and training offerings complete our full service portfolio. We tailor the commissioning according to your needs, from installation and familiarization to IQ/OQ and qualification services, maintenance contracts and a flexible training program for users. More about the PSS service offerings can be found on page 22 of this brochure.



Press the button and start obtaining reproducible and reliable results.

## From Standard to UPLC, from Nano to Prep



**Analytical:** Ideal for standard analytical separations on e.g. GPC/SEC columns with approximately 8 mm ID



**Bioinert:** Ideal for LC of biopolymers and proteins at extreme pH values or for applications under harsh conditions



**Micro:** Ideal for high-resolution UHPLC/UGPC, for (micro) columns with small particles and ID, lowest band broadening effect for multi-detection

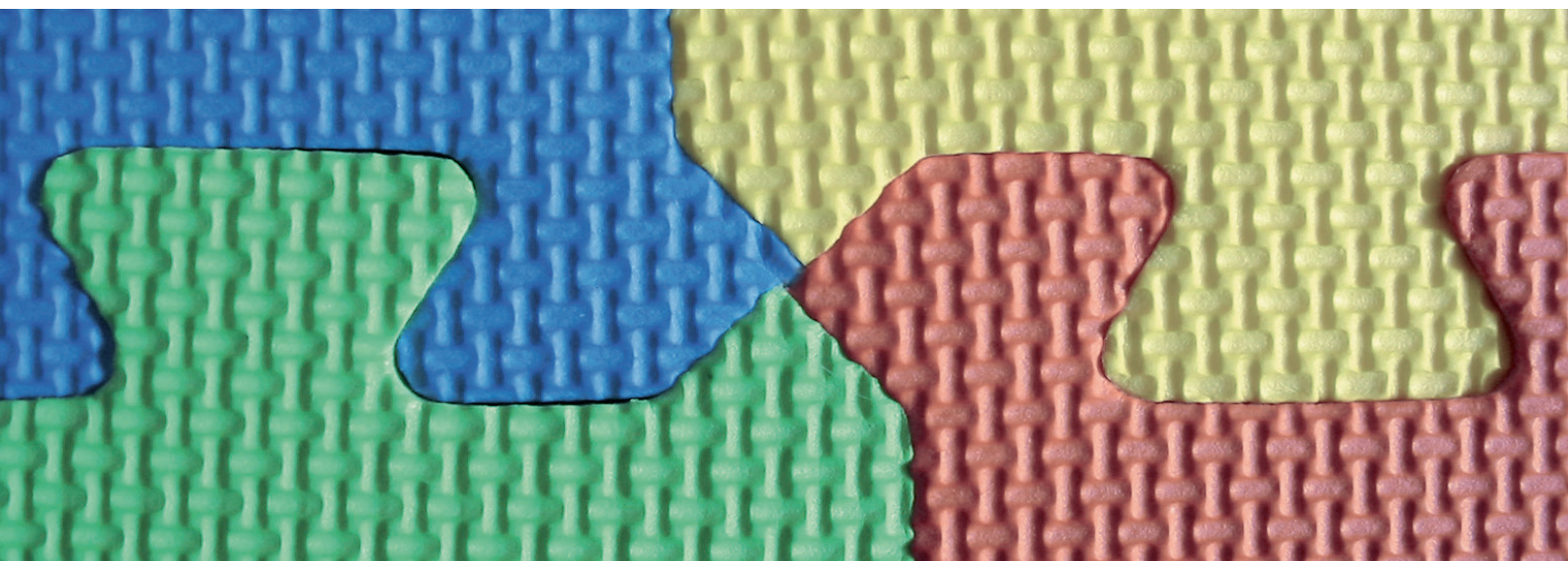


**Prep:** Ideal for higher sample loadings and flow rates, fractionation and purification of samples



**Nano:** Ideal for separations at very low flow rates and with very low concentrations

# (Bio)SECcurity<sup>2</sup> Degasser/Pumps/Injectors/Column Compartments



Optimized for the analysis of all types of polymers, biopolymers and proteins (Bio)SECcurity<sup>2</sup> is tailored to your needs. The small instrument footprint allows the installation of (Bio)SECcurity<sup>2</sup> components in a stack which fits into every laboratory. Easy-to-use plug&play components can be retrofitted at any time ensuring a consistent upgrade path.

Automatic detection of devices in the stack and convenient operation using the WinGPC ChromPilot and/or the external SECcurity<sup>2</sup> control panel make everyday lab operations easy. Detailed device logs with warnings when exceeding maintenance intervals (Early Maintenance Feature, EMF) ensure traceability and minimize instrument downtime automatically.

Detailed specifications for all modules can be found on the Web:

<http://www.pss-polymer.com/products/lc-instruments-and-detectors/>



## (Bio)SECcurity<sup>2</sup> Degasser

The (Bio)SECcurity<sup>2</sup> Degasser is a dedicated inline vacuum degasser suitable for all solvents used in IPC and GPC/SEC including HFIP. It is available with 2 or 4 independent channels and operates efficiently and effectively, even at high flow rates.

### Available are:

- SECcurity<sup>2</sup> 2-Channel-Inline-Degasser
- SECcurity<sup>2</sup> 4-Channel-Inline-Degasser



## (Bio)SECcurity<sup>2</sup> Pumps

GPC/SEC precision relies on pump performance. The (Bio)SECcurity<sup>2</sup> pumps offer superior retention volume precision, day in day out. This increases the result accuracy and avoids the need of recalibration saving time and solvent.

Enhanced security features such as maximum and minimum pressure limits, pressure ramps and leak sensors protect the separation columns and the surroundings. Easy recording of pump pressure and ripple allows calculation of result precision in WinGPC UniChrom.

**Unique:**

Upgrade path from isocratic to gradient: Start with the isocratic pump and use the isocratic to quaternary gradient pump upgrade kit to extend the solvent range up to 4 solvents for low pressure gradient mixing.



**Available are:**

- SECcurity<sup>2</sup> isocratic pump
- SECcurity<sup>2</sup> quaternary gradient pump
- SECcurity<sup>2</sup> binary gradient pump
- BioSECcurity<sup>2</sup> quaternary gradient pump

For all pumps: pre-installed or retrofittable seal wash option.

## (Bio)SECcurity<sup>2</sup> Injection Systems

Precise injection volume is important for conventional GPC/SEC with RI and/or UV detection. Accurate injection volume is essential for systems with light scattering or viscometry detection (Triple detection). The SECcurity<sup>2</sup> autosamplers show highest precision < 0,5% RSD and superior accuracy. Additional benefits are the fast cycle time and the unique flow-through design that make this system the first choice for HighSpeed analysis.



**Available are:**

- SECcurity<sup>2</sup> manual injector
- BioSECcurity<sup>2</sup> manual injector
- SECcurity<sup>2</sup> standard autosampler
- SECcurity<sup>2</sup> thermostatted autosampler
- BioSECcurity<sup>2</sup> standard autosampler
- BioSECcurity<sup>2</sup> thermostatted autosampler

## (Bio)SECcurity<sup>2</sup> Column Compartments

Maximum resolution can be obtained in GPC/SEC by using multiple separation columns connected in series. A spacious column oven, providing room for several columns and a precolumn and offering precise thermostatic control for stable baselines and superior reproducibility, is a good investment, especially when using highly viscous solvents. The (Bio)SECcurity<sup>2</sup> column compartment is also suitable for TGIC.



**Available are:**

- (Bio)SECcurity<sup>2</sup> column compartment TCC6500 up to 80 °C or TCC7000 up to 90 °C
- (Bio)SECcurity<sup>2</sup> column compartment TCC1260 for 4 °C up to 110 °C and with room for up to 3 GPC/SEC analytical columns

Optional: high-pressure switching valves and valve mounting points.



## (Bio)SECcurity<sup>2</sup> Detectors: Concentration Detectors



The perfect detection option for every task: Multi-detection is one of the strengths of GPC/SEC and allows not only the precise molecular weight determination but also analyses of composition, branching and structures. The (Bio)SECcurity<sup>2</sup> detector line offers highly sensitive detectors of both types, concentration detectors and molar mass sensitive detectors. These can be seamlessly combined for comprehensive characterization of all types of macromolecules.



### SECcurity<sup>2</sup> RI Detector

The SECcurity<sup>2</sup> RI detector is the detector of choice for the analysis of all non-UV absorbing samples. It is the ideal concentration detector for the hyphenation with on-line light scattering detectors or on-line viscometers. Electronic temperature regulation maintains a steady optical unit temperature up to 55°C resulting in an exceptionally stable baseline. For high resolution separations with the lowest band broadening, the  $\mu$ SECcurity<sup>2</sup> RI, with its smallest cell volume and low dead volume tubing, is the detector of choice.

#### Available are:

- SECcurity<sup>2</sup> RI
- SECcurity<sup>2</sup>  $\mu$ RI, optimized for high resolution GPC/SEC



### (Bio)SECcurity<sup>2</sup> UV/VIS Detectors

The (Bio)SECcurity<sup>2</sup> VWD is a sensitive detector with variable wavelength in the range of 190-600 nm for UV/VIS-active substances. Included is a spectral scan function to determine the UV absorption maximum. This detector is ideally suited for protein analysis and copolymer analysis or as a concentration detector in a UV-based Triple (Plus) detection system. It is alternatively available as a (Bio) SECcurity<sup>2</sup> multi-wavelength version with the ability to monitor 6 selectable wavelengths simultaneously.



**And for applications with highest requirements:**

The (Bio)SECcurity<sup>2</sup> diode array detector with 1024 diodes and Deuterium and Tungsten lamp for the wavelength range 190-950 nm satisfies all needs.



**Available are:**

- SECcurity<sup>2</sup> variable wavelength detector VWD
- SECcurity<sup>2</sup> multiple wavelength detector MWD
- SECcurity<sup>2</sup> diode array detector DAD
- BioSECcurity<sup>2</sup> variable wavelength detector VWD
- BioSECcurity<sup>2</sup> multiple wavelength detector MWD
- BioSECcurity<sup>2</sup> diode array detector DAD

Micro cells, optimized for high resolution separations, and preparative cells are available for all UV/VIS detectors.

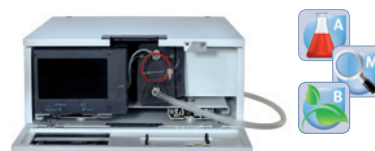
**(Bio)SECcurity<sup>2</sup> Evaporative Light Scattering Detector**

This evaporative light scattering detector, ELSD, with patented THERMO SPLIT technology, excellent sensitivity, extremely low detection limit and pronounced dynamic range is used for a wide range of applications.

The ELSD is ideally suited as a standard detector for 2-dimensional chromatography. It is the perfect substitute for RI detectors, when gradient IPC is performed, when highest sensitivity is required or for isorefractive systems.

**Available is:**

- SECcurity<sup>2</sup> ELS1260



**(Bio)SECcurity<sup>2</sup> Fluorescence Detector**

This fluorescence detector with flash lamp for highest sensitivity and lowest detection limit allows both, spectra acquisition and simultaneous detection of multiple signals in the range of 200 to 700 nm.

**Available are:**

- SECcurity<sup>2</sup> Fluorescence Detector
- SECcurity<sup>2</sup> Fluorescence Detector with 3D emission/extinction spectra option
- BioSECcurity<sup>2</sup> Fluorescence Detector
- BioSECcurity<sup>2</sup> Fluorescence Detector with 3D emission/extinction spectra option



Micro cells are available for high resolution separations.

# (Bio)SECcurity<sup>2</sup> Detectors: Molar Mass Sensitive Detectors



## (Bio)SECcurity<sup>2</sup> Viscosity Detector DVD1260

This thermostatted differential viscometer is ideal for on-line measurement of specific and intrinsic viscosity, determination of true molecular weights via universal calibration, determination of Mark-Houwink coefficients and determination of branching and degree of branching.

High-quality, low-hysteresis and chemically inert Hastelloy pressure transducers, with protection against overpressure, ensure low band broadening and outstanding signal quality without the need for extensive detector signal processing. Combined with a concentration detector and a light scattering detector this viscometer can be used as Triple Plus detection system.



### Faster analysis with no hold-ups:

For ease of use and short analysis times an integrated solvent reservoir is used. This eliminates the need to wait for the negative peak or to adjust the number of hold-up columns with the number of separation columns.

### Available are:

- SECcurity<sup>2</sup> DVD1260
- SECcurity<sup>2</sup> DVD1260M, optimized for high resolution GPC/SEC
- BioSECcurity<sup>2</sup> DVD1260B, bioninert version



## (Bio) MDS Integrated Triple Detection System

The MDS detector system is available for integrated multi-detection. It can be equipped with a dual-angle light scattering detector (15° and 90°), a dynamic light scattering option (QELS), a viscometer with hold-up columns and a refractive index detector in a space-saving housing that minimizes dead volumes.



### Unique for integrated multi-detection systems:

The modular design allows the initial configuration to be retrofitted with additional detection options.

### Available are:

- MDS Viscometer with hold-up columns
- MDS Static Light Scattering, SLS, 15° and 90°, optional Dynamic Light Scattering, DLS
- MDS RI detector with fixed wavelength of 660 nm

**Any of the combinations** can be ordered, depending on the application.

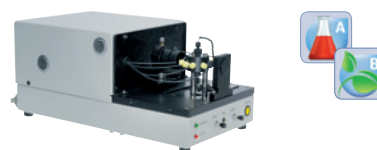
## (Bio)SECcurity<sup>2</sup> Multi Angle Light Scattering Detector SLD7100

This batch and GPC/SEC on-line multi angle static light scattering detector for the determination of absolute molar mass, radius of gyration, structure and of aggregation allows the simultaneous measurement of the scattering intensities at 7 different angles between 35° and 145°. Its novel vertically arranged, cylindrical flow cell provides index matching which eliminates the necessity to apply solvent dependent corrections to the detection angles. Compared to traditional glass cells the SLD7100 PEEK cell is characterized by significantly improved cell stability, especially in difficult solvents such as HFIP.

### Available are:

- SECcurity<sup>2</sup> SLD7100
- BioSECcurity<sup>2</sup> SLD7100B, bioinert version

When combined with a concentration detector and a viscometer this light scattering detector can be used as a Triple Plus detection system.



## (Bio)SECcurity<sup>2</sup> Multichrom Light Scattering Detector SLD1000

Online 90° static light scattering detector for the determination of absolute molecular weights with an selectable wavelength in the range of 300-600 nm. In contrast to conventional light scattering detectors the wavelength of the SLD1000 can be adjusted for each sample. This enables the characterization of colored solutions and also fluorescent samples. By optimizing the wavelength selection to give the highest sample  $dn/dc$ , even small molar masses can be detected with high signal quality and moderate concentrations.

### Available are:

- SECcurity<sup>2</sup> SLD1000
- SECcurity<sup>2</sup> SLD1000M, optimized for high resolution GPC/SEC
- BioSECcurity<sup>2</sup> SLD1000B, bioinert version

Combined with a concentration detector and a viscometer this light scattering detector can be used as a Triple detection system.



You do not know the sample  $dn/dc$  or do not want to use literature data? **PSS  $dn/dc$  instruments allow the fast and efficient determination of precise and accurate  $dn/dc$  values for different wavelengths...** or let our contract analysis laboratories measure the  $dn/dc$  values for you.





## Our Solutions for your Laboratory



**Macromolecular samples differ significantly from each other. They range from proteins to polyolefins, from very low molar masses to extremely high molar masses, from applications in the pharmaceutical QC to high performance complex polymers in R&D. Just as there are different sample types to be analyzed, there are different demands for the perfectly matching analytical instrument.**

PSS offers the right solution for your application and environment – and if required, we will also provide a corresponding analysis method. Comprehensive service combined with fast and efficient support ensure a quick start and gives you confidence in obtaining consistent, reproducible and reliable results.

A selection of our solutions can be found in this brochure, other solutions are available at: [www.pss-polymer.com](http://www.pss-polymer.com)

Recommendations for analytical conditions and high resolution columns can be found at: [www.psscolumselector.com/gpc-sec-applications-column-tool](http://www.psscolumselector.com/gpc-sec-applications-column-tool)

Please do not hesitate to contact us, it would be our pleasure to assist you in finding the perfect solution.

## SECurity<sup>2</sup> Starter Package



The entry level solution is ideal for every GPC/SEC beginner: Easy to learn and use, powerful and robust with an unbeatable price/performance/instrument uptime ratio.

### The starter package includes

- SECurity<sup>2</sup> isocratic pump
- SECurity<sup>2</sup> manual injector
- SECurity<sup>2</sup> column compartment
- SECurity<sup>2</sup> RI detector
- WinGPC UniChrom software with ChromPilot instrument control

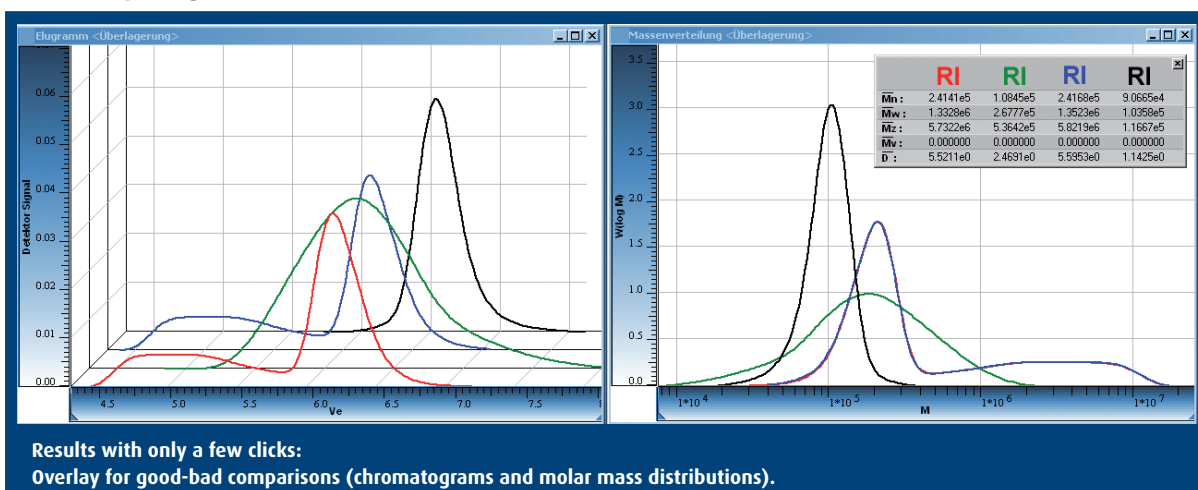


SECurity<sup>2</sup> starter package with manual injector.

### and can be upgraded with

- degasser
- autosampler
- additional detectors, instruments and methods

The starter package is also available as a bioinert version.



## SECurity<sup>2</sup> GPC/SEC Research System



Modular upgrade-capability and lab-proven stability are the key features of this flexible state-of-the-art solution. In addition to being able to facilitate multi-detection with viscometry and all light scattering techniques, it is also well-suited for the comprehensive analysis of copolymers and HPLC-type quantifications. The possibilities of hyphenation with other spectroscopic or spectrometric methods, such as mass spectrometry or FTIR analysis, make this system our most comprehensive solution. More information about our WinGPC software with all the modules can be found in our separate WinGPC brochure or online:

[www.pss-polymer.com/products/macromolecular-chromatography-data-systems/wingpc-unichrom-mcdfs/](http://www.pss-polymer.com/products/macromolecular-chromatography-data-systems/wingpc-unichrom-mcdfs/)

### The research system consists of

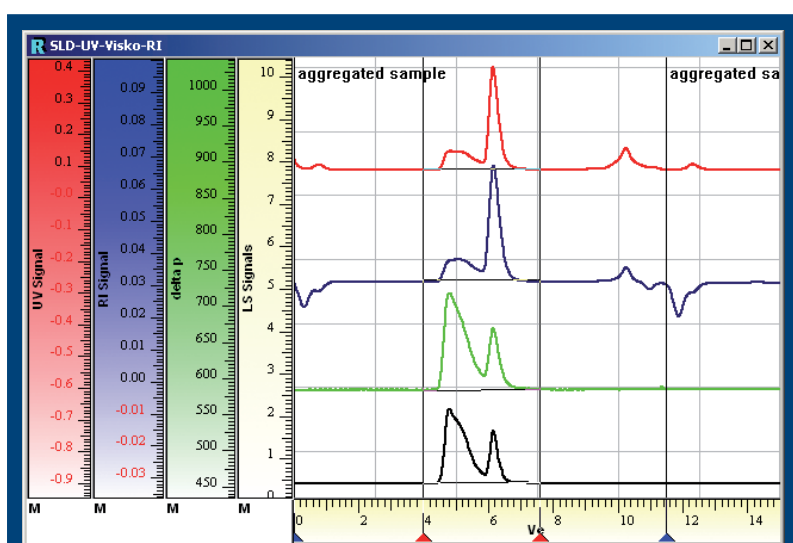
- SECurity<sup>2</sup> isocratic pump
- SECurity<sup>2</sup> autosampler
- SECurity<sup>2</sup> column compartment
- SECurity<sup>2</sup> RI detector
- WinGPC UniChrom software with ChromPilot system control

### and can be upgraded with

- detection options such as multi-detection (light scattering SLS/DLS, viscometry), DAD/PDA including 3D spectra capabilities, ELSD, fluorescence detection including 3D emission/extinction spectra capabilities
- (automatic) valves for fractionation, 2D separation or column switching
- fraction collectors
- mass spectrometry or FTIR hyphenation



SECurity<sup>2</sup> Research System



**Multi-detection:**  
Precise and high quality raw data from concentration and molar mass sensitive detectors, true molecular weights and structural information.





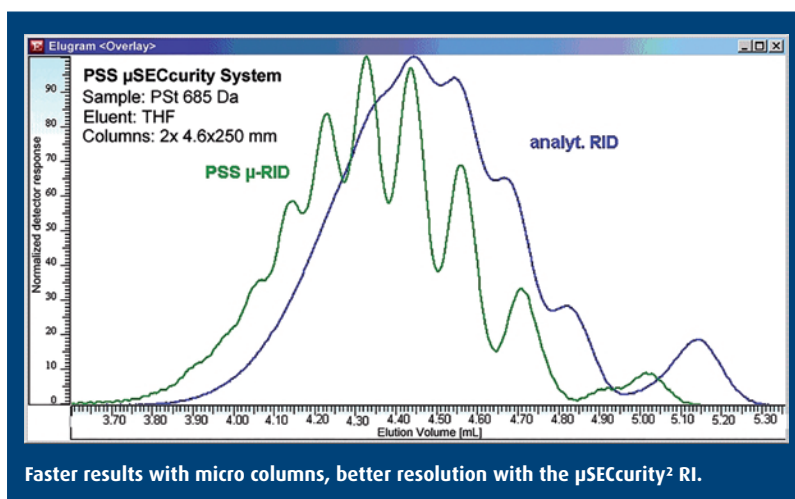
## μSECcurity<sup>2</sup> Semi-micro System



Just like in UHPLC, there is now a trend in GPC/SEC to separate low molar mass polymers and oligomers on columns filled with particles of small particle size. Unlike UHPLC, the challenge in uGPC/SEC is not the extremely high pressures, but the cell volumes of typical GPC/SEC detectors and the dead volumes, especially in multi-detection setups. If the cell volume is too large, the previously separated oligomers will be backmixed in the detector cell and the advantage of small particle sizes and customized micro columns is lost. With μSECcurity<sup>2</sup> a system with smallest cell and dead volumes, specifically designed for the use with GPC/SEC micro columns, is now available for high resolution separation and fast analysis times.



μSECcurity<sup>2</sup> System



### The system consists of the following optimized components

- SECcurity<sup>2</sup> Pump (isocratic, gradient)
- SECcurity<sup>2</sup> High-performance autosampler for well plates and vials or SECcurity<sup>2</sup> manual injector
- SECcurity<sup>2</sup> μRI

### and can be upgraded with

- SECcurity<sup>2</sup> UV detector (one or more wavelengths) or DAD
- SECcurity<sup>2</sup> 90° multichrom light scattering detector SLD1000M (RALLS)
- SECcurity<sup>2</sup> DVD1260M online viscometer
- SECcurity<sup>2</sup> column compartment

### matching separation columns

PSS micro columns with small inner diameter and small particle sizes

- precolumn 4.6 x 30 mm
- high resolution columns 4.6 x 250 mm
- stationary phases: PROTEEMA, SUPREMA, PFG, PolarSil, SDV



## BioSECcurity<sup>2</sup> SEC System/Protein Analyzer



Biopolymer analysis demands a highly robust chromatographic system, due to high salt concentrations and extreme pH values used. In addition, metal ions can interfere with the chromatography and decrease column lifetime. The ideal solution for applications such as protein molar mass determination, protein purity analysis and protein aggregation investigation is the BioSECcurity<sup>2</sup> SEC system, which uses optimized, stainless steel free components. Routine bio-analysis, even with sophisticated molar mass sensitive detection, under harsh conditions has never been so easy and powerful.

### The system consists of the following bioinert components

- BioSECcurity<sup>2</sup> quaternary pump
- BioSECcurity<sup>2</sup> (thermostatted) high performance autosampler for well plates and vials or BioSECcurity<sup>2</sup> manual injector
- BioSECcurity multiple wavelength UV detector or DAD

### modular upgradeable with

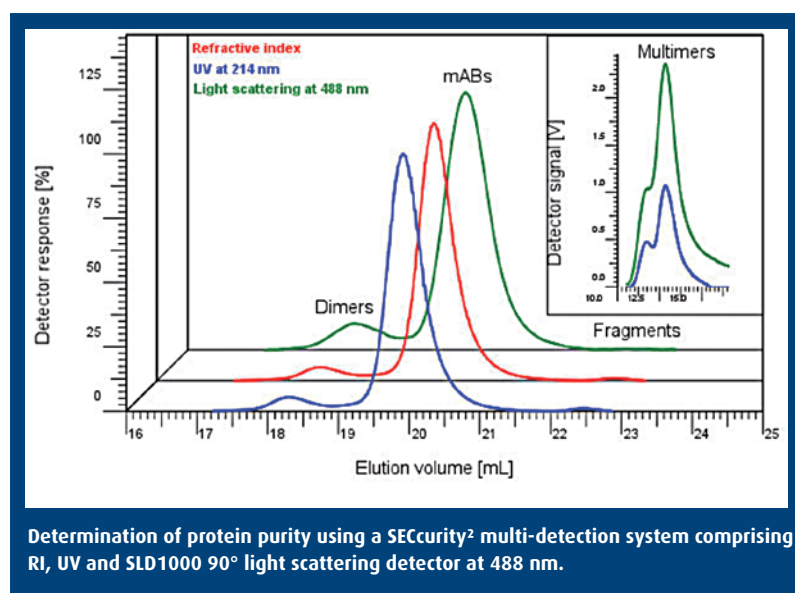
- BioSECcurity<sup>2</sup> 90°-multichrom light scattering detector SLD1000B (RALLS) or or multi angle light scattering detector SLD7100B (MALLS)
- MDS-Bio, 15°/90° dual angle light scattering detector with dynamic light scattering as an option
- BioSECcurity<sup>2</sup> DVD1260B online viscometer
- SECcurity<sup>2</sup> column compartment

### Matching PSS high resolution columns

- PROTEEMA precolumn
- PROTEEMA (analytical or micro columns) available in different particle sizes and pore sizes 100 Å, 300 Å and 1 000 Å.



Protein Analyzer



Determination of protein purity using a SECcurity<sup>2</sup> multi-detection system comprising RI, UV and SLD1000 90° light scattering detector at 488 nm.



## Heparin Analyzer



For the fast, precise and accurate analysis of low molecular weight and high molecular weight Heparins according to US and EU Pharmacopeia, including all calibration options.

### The system includes all components required for USP and EP heparin analysis and consists of

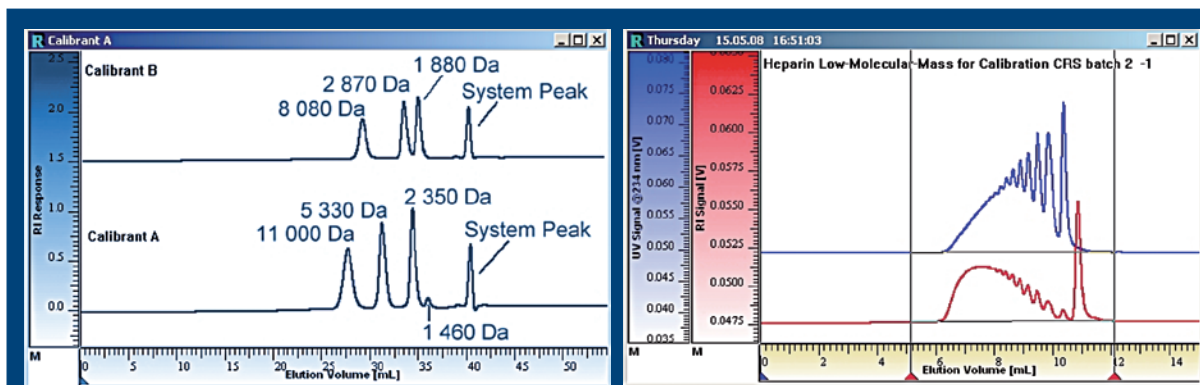
- SECurity<sup>2</sup> 2-channel degasser
- SECurity<sup>2</sup> isocratic pump
- SECurity<sup>2</sup> autosampler
- SECurity<sup>2</sup> UV detector (optional if only US Pharmacopeia is required)
- SECurity<sup>2</sup> RI detector
- WinGPC UniChrom software with ChromPilot system control
- WinGPC Heparin module



Heparin Analyzer

### with the options

- SECurity<sup>2</sup> column compartment
- PSS PROTEEMA columns for EP
- PSS PFG columns for USP
- EP and USP reference materials



Calibration with USP Heparin calibrants A and B detected with a SECurity<sup>2</sup> RI detector. EP reference material detected with SECurity<sup>2</sup> VWD and RI.

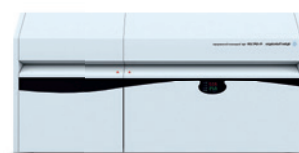




## GPC 220 High Temperature GPC



Polyolefins, such as polyethylene or polypropylene, are often only soluble at high temperatures. They require special solvents and high temperatures need to be maintained during the analysis to keep the sample completely dissolved. Therefore, for the analysis of these polymers, dedicated high temperature GPC systems are used. The GPC 220 is a fully integrated high temperature GPC system with optional triple detection up to a temperature of 220° C.



GPC 220 High Temperature GPC

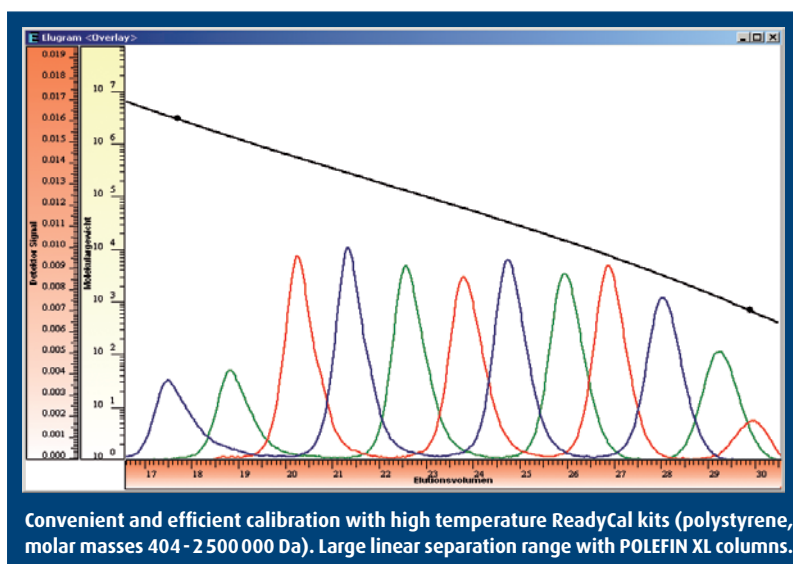
### The GPC 220 integrated HT-GPC system consists of

- SECcurity<sup>2</sup> isocratic pump
- dual-zone heated autosampler
- a spacious and easy-access column compartment for up to six analytical 300 mm columns
- an RI detector working at a fixed wavelength of 890 nm
- WinGPC UniChrom software

### options are

- GPC 220 viscometer
- GPC 220 dual angle light scattering detector
- SP260 VS sample preparation system

PSS POLEFIN high temperature GPC columns with a large molar mass separation range and PSS polystyrene HT ReadyCal calibration kits are the perfect match for the GPC 220.



(Bio)SECcurity<sup>2</sup> Pharma



Compliance for macromolecules? You bet! PSS system solutions help you to satisfy even the most stringent requirements of the FDA, the EMEA or other national and international authorities.

(Bio) SECcurity<sup>2</sup> equipped with PSS WinGPC software is easy to qualify and re-qualify. **PSS IQ/OQ services** with single component and holistic tests under true GPC/SEC conditions guarantee a fast start and uninterrupted operation with long term reproducibility. The scope of each of our qualification services is defined in close consultation with you and your validation department.



(Bio)SECcurity<sup>2</sup> Pharma

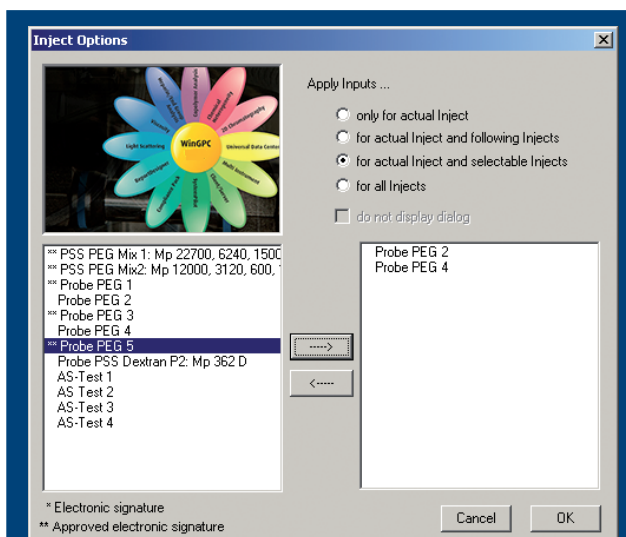
The (Bio)SECcurity<sup>2</sup> pharma solution consists of

- SECcurity<sup>2</sup> isocratic pump
- SECcurity<sup>2</sup> autosampler
- SECcurity<sup>2</sup> column compartment TCC6500 with enough room for high resolution column banks
- SECcurity<sup>2</sup> RI detector with integrated solvent recycling valve
- WinGPC UniChrom Software with ChromPilot-system control
- WinGPC Compliance Pack (allows for FDA 21 CFR part 11 compliance)
- PSS IQ/OQ services

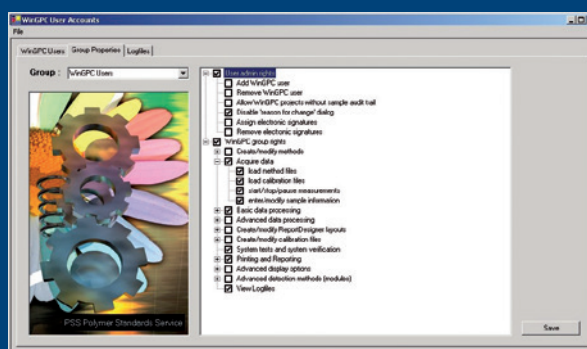
upgradeable with

- all options for (Bio)SECcurity<sup>2</sup>
- all (Bio)SECcurity<sup>2</sup> concentration detectors
- all (Bio)SECcurity<sup>2</sup> molar mass sensitive detectors

Customized maintenance contracts including requalification services are also available.



\* Electronic signature  
\*\* Approved electronic signature



**WinGPC Compliance Pack:**  
User levels, audit trails, e-signatures always traceable and transparent, with unmatched user-friendliness.



## 2D Polymer Analyzer



2-dimensional chromatography combines the separation power of methods such as GPC/SEC, IPC, LACCC, TREF, CE and enables analysis with highest peak capacity. It provides the simultaneous determination of different polymer properties such as molar mass distribution and composition distribution or end group distribution.

The heart of the PSS 2D Polymer Analyzer is the automated electric switching valve, which is fully controlled by WinGPC UniChrom to provide automated transfer of the fractions from the first to the second dimension. A unique WinGPC feature is the possibility not only to create contour plots and meaningful figures, but also to define peaks to obtain molar mass and composition results.



2D Polymer Analyzer

### The 2D Polymer Analyzer consists of

#### 1st dimension Polymer HPLC

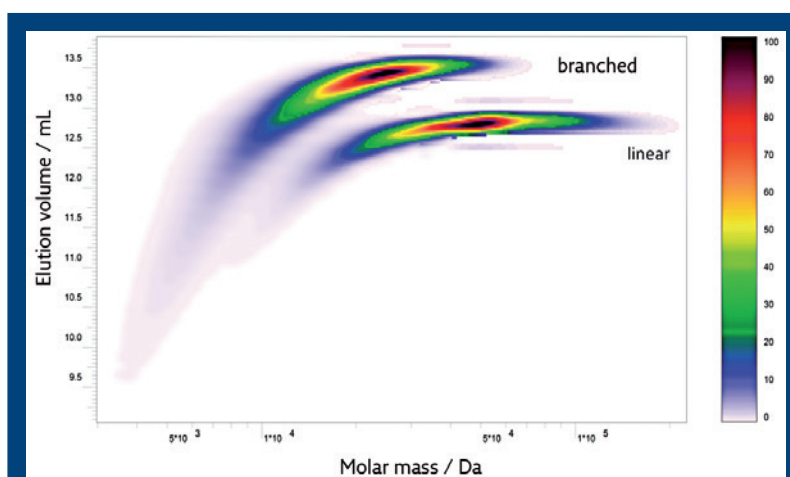
- SECurity<sup>2</sup> binary pump
- SECurity<sup>2</sup> autosampler
- SECurity<sup>2</sup> column compartment TCC1260
- SECurity<sup>2</sup> transfer valve with 2D valve head

#### 2nd dimension GPC/SEC

- SECurity<sup>2</sup> isocratic pump
- SECurity<sup>2</sup> ELS1260
- WinGPC UniChrom software for 2 independent time bases with ChromPilot system control and 2D module

#### Options

- SECurity<sup>2</sup> UV/VIS detector for method development
- other SECurity<sup>2</sup> detectors
- WinGPC software modules Copolymers and Chemical Heterogeneity
- PSS GPC/SEC HighSpeed columns or columns optimized for fast separations in the 2nd dimension
- method development service



Separation and simultaneous determination of molar masses of a branched and a linear polymer with the 2D Polymer Analyzer.





## (Bio)SECurity<sup>2</sup> Valve Options, Fraction Collectors and Prep Systems



Convenient column switching during sequence runs or using liquid chromatography for preparative fractionations are also possible with (Bio)SECurity<sup>2</sup>.

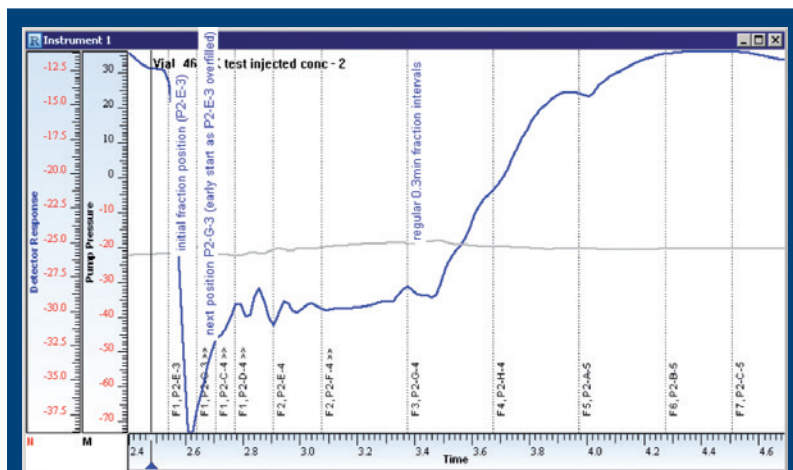
(Thermostatted) fraction collectors for different tasks and a unique concept with flexible valve drives and interchangeable valve heads not only provide convenient analytical GPC/SEC analysis, but also enable you to perform other necessary tasks in your laboratory.

### Available are

- (Bio)SECurity<sup>2</sup> electric valve drives integrated either in the column oven or mounted in a separate workflow module or externally attached to the stack
- (Bio)SECurity<sup>2</sup> valve heads for 2D chromatography, column switching, fractionations
- Fraction collectors with optional cooling, for well plates or with a learning program option for use with your own vessels.



Depending on the setup and requirements, WinGPC will document the fractions with the raw data.



WinGPC fraction marks: documentation of the fractions in the raw data together with vial position and automated comments in case of overflowing.



## Validation, Service and Support



Comprehensive hardware and software services plus highly qualified, personal and fast support, including assistance for development of new methods and column selection, make all the difference.



**PSS provides not only robust and easy-to-use systems and components but also offers complete service and support for long-term reproducible results:**

- **Assembly** of turn-key solutions
- **Integration** of new PSS solutions into **existing hardware**
- Maintenance, testing and (re)qualification of systems based on customized **service contracts** or on a one-time basis
- Integration of our solutions in the **lab IT infrastructure** with WinGPC single-user applications, WinGPC client-server solutions or (Bio)SECcurity<sup>2</sup> components in existing chromatography data systems
- Trainings, webinars, user meetings and **in-house training**
- **Training** on all aspects of the characterization of macromolecules with LC techniques

## PSS Product Overview

### Supplies and Services for Comprehensive Characterization of Natural and Synthetic Macromolecules

#### Reference Polymer Standards

- GPC/SEC Standards and Kits
- Certified Reference Materials
- MALDI Kits
- Viscosity & Light Scattering Validation Kits
- ReadyCal Kits
- Deuterated Polymers
- Tailor made Polymers and Copolymers
- Particle Standards

#### Software

- WinGPC UniChrom MCDS  
Light Scattering Module for LALLS, RALLS, TALLS, MALLS  
Viscosity Module  
Copolymer Module  
End-group Analysis Module  
2-dimensional Chromatography Module  
Heparin Module  
LAN/Server Solutions  
Compliance Pack
- PoroCheck Software

#### GPC/SEC, IPC and 2D Instruments

- LC Systems and Components
- Light Scattering Detectors
- Viscosity Detectors
- dn/dc Instrumentation

#### GPC/SEC Columns

- For all Organic Eluents
- For all Aqueous Eluents
- For High and Low Molecular Weight
- Synthetic and Biopolymers
- From Micro GPC/SEC up to Preparative Scale
- HighSpeed Columns for fast Analysis

#### Analytical Services

- Molar Mass Determination
- Branching/Structure Information
- Method Development and Transfer
- Complete Product Deformation
- Consulting

#### Training and Support

- IQ/OQ
- Full Services from Installation to Validation, Operation and Repair
- GPC/SEC and Software Training Schools
- In-house Training
- User Meetings
- NetCommunity with Application and Publication Downloads
- GPC/SEC Tips&Tricks, Troubleshooting
- Webinars

### More information and brochures



**WinGPC UniChrom**  
Options and software modules



**Reference Materials and LC columns**  
includes applications and FAQs



**GPC/SEC Services**  
Contract analysis, services and training



**2D Polymer Analysis Primer**  
Everything you need to know about the 2D analysis of macromolecules

your local distributor

[www.pss-polymer.com](http://www.pss-polymer.com)