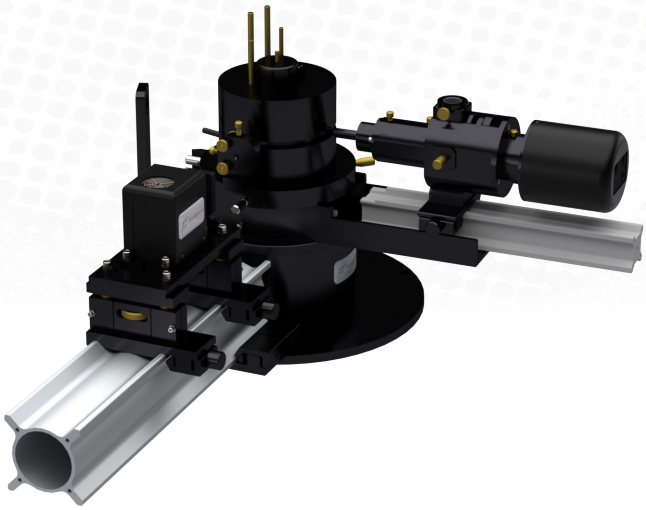
Dynamic & Static Light Scattering System

Brookhaven Instruments' **BI-200SM** system opens the door to the rich fields of exploration of both Static Light Scattering (SLS) and Dynamic Light Scattering (DLS).

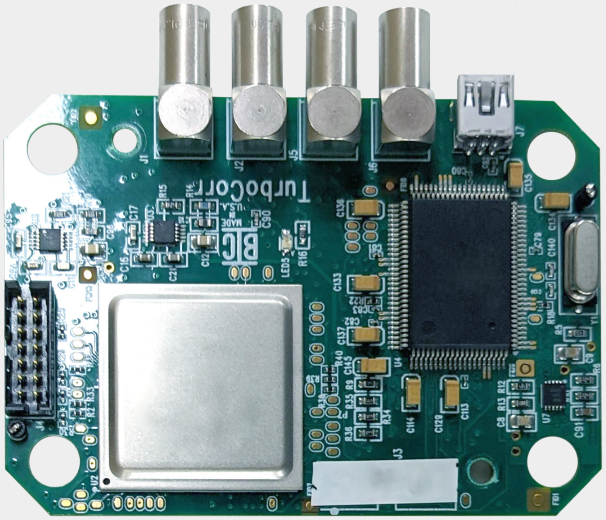
The **BI-200SM Research Goniometer System** provides access to these studies with an automatic, modular and versatile system. It is a precision instrument designed for exacting scattering measurements. Based on a special turntable with precision ball bearings and stepping motor, the **BI-200SM's** modern design and quality construction guarantee precise measurements due to the wobble-free movement of the detector. It is field proven in thousands of laboratories. It is ideal for molecular studies and submicron particle sizing.



Key Capabilities

- Nanoparticle Characterization
- Partile Size Distribution
- Protein & Polymer Characterization
- Molecular Weight
- Complex Fluid Characterization

Brookhaven Instruments' scientists have extensive experience in the development of instruments and methods for light scattering. This experience has been incorporated into the **BI-200SM** to make it the finest instrument available for research applications of light scattering.



TurboCorr Digital Correlator
Features at a Glance

- USB Communications
- Compact Size, low power requirements (less than 300 mW)
- Auto & cross-correlation modes
- Up to 522 hardware channels
- Delay range 25 ns to 1310 s
- 100% efficient, real-time operation over the full delay time range

Special Features of the BI-200SM Research Goniometer System

Both DLS & SLS Modes
Correlation & Intensity Measurements.

Large Angular Range
8° to 155° with 25 mm cells; 15° to 155 with 12 mm cells.

Fine Adjustment Control
Read angle to 0.01° directly on large, fine-control knob.

Open Design/ Standard Optical Rails
Facilitates user customizations for special purposes.

Temperature Control
Automatic heating and cooling with internal probe and any standard external circulator.

Isolated Circulation System
Separate temperature and filtration plumbing.

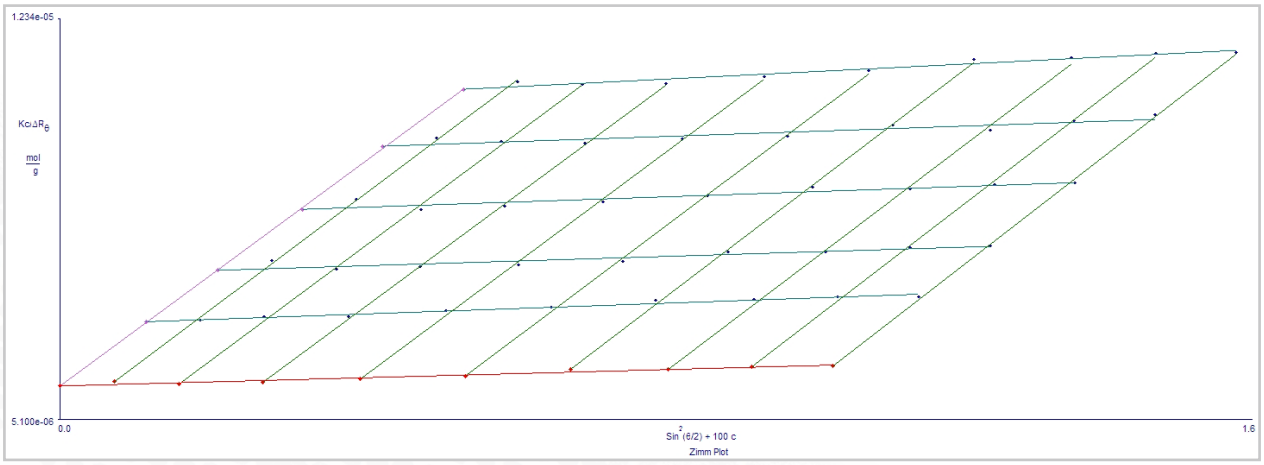
Special Design Glass Vats
Specially polished entrance window ensures minimum flare.

Alignment Cell
Fine-screw vertical adjustment makes center of rotation easier.

Multiple Laser Line Filters
Filter wheel with 640 nm, 514 nm, and 488 nm, one open position for weak scatterers, and two blank (shutter) positions. Also available with band-pass filters for other wavelengths.

Enhanced Viewing Optics
Coated, precision achromats coupled with behind-the-slit viewing and high quality eyepiece and alignment camera make alignment easier.

Variety of Cell Holders
High precision cell holders, standard, low-rise round cells available: 27.5 mm dilution vials fit cell holder sleeve. Special small-volume cell available.



An example of a Zimm plot produced by the **BI-200SM**

In the field of DLS, the dynamics of the scattered light are quantified and analyzed. The short-term intensity fluctuations (dynamics) of the scattered light arise from the fact that the scattering particles are undergoing rapid thermal motions. These movements are called Brownian motion and they cause short term fluctuations in the intensity of the scattered light.

Typical DLS Applications

- Particle size distribution
- Particle aggregation phenomena
- Micellar systems
- Micro-emulsion technology
- Colloid behavior
- Vesicles & liposomes
- Plasmid DNAs
- Particle size growth
- Nucleation processes & protein crystallization

The **Mini-L40** is a small, stand-alone, red laser diode assembly with superb temperature and power stabilization. It can be used with Brookhaven's BI-200SM goniometer for dynamic and static light scattering. With nominal 40 mW power at a wavelength of 640 nm, it is an ideal replacement for the 35 mW, HeNe laser (632.8 nm) when space is at a premium.

Features at a Glance

- 40 mW, 640 nm, Class 3B
- Compact Diode Laser, 11 cm in length
- $TEM_{00,}$ stabilized, calibrated
- For use in SLS/DLS

The **BI-200SMPt** allows direct measurement of the temperature in the index matching liquid near the sample cell. It is no longer necessary to assume the temperature of the external circulator is the same as the cell temperature. Values are updated every second in 32-bit BI-DLSW software and used in calculations. A USB cable is provided that connects the data interface to the PC. Power for the Pt is supplied through this same cable. BI-200SM goniometers supplied after August 2006 are ready to accept the screw-in thermometer. Goniometers delivered earlier will require a manifold swap. Careful removal and replacement of a manifold will not disturb alignment. Contact the factory for more information.

Features at a Glance

- USB powered
- Direct measurement in vat
- Fully integrated with 32-bit, constant current

In SLS mode, time-averaged intensity measurements are made at either fixed or variable angles in the range of 8° to 155° and analyzed with software provided for the methods of Zimm, Berry, Debye, Guinier, Kratky, etc.

Typical SLS Applications

- M_w Molecular weight determinations
- R_G Radius of gyration
- A_2 determination of second viral coefficient
- Micro-emulsion technology
- Colloid behavior complex fluid characterization
- Emulsion polymerization
- Particle size growth nucleation processes

Key Features & Specifications

Beam Focus & Steering Lenses	Includes mounts, adjustments, and apertures.
Turntable	200 mm OD turntable, worm gear and ball bearings; manual or automatic selection of angles in 0.01° steps; precision machined base with mounting holes; positioning table with micrometer adjustments.
Specimen Cell Assembly	Including thermal enclosure, centering adjustments, separate plumbing for temperature control and index matching liquids, round cell holders, square cell holder and alignment cell.
Index Matching Vat	With optically flat and specially polished entrance window; precision machined and annealed to minimize stray light.
Periscopic Beam Stop	Located inside vat to prevent flare from exit windows; provided with coupling for use with optional, zero-angle reference detector.
Detector Optics	Entrance aperture of 3 mm. Coated, adjustable achromat for focusing scattered light onto 200 µm slit. Slit position adjustable. Reflex mirror and high quality eye piece for viewing scattering region through slit. Filter turret with 640, 514, and 488 nm, 2 closed positions, and 1 open position. Other filters available. Secondary pinhole turret: 100, 200, and 400 µm pinholes for DLS measurements; 1, 2, and 3 mm pinholes for SLS measurements.
BI-200SMPt	Allows direct measurement and control of temperature in the index matching liquid, -25° C to 155° C.

Standard Accessories

BI-TCD	Digital temperature controller, external circulator type -20° C to 100° C, alphanumeric setting and readout, ± 0.1° stability.
BI-FC	Filtration/circulation system for index matching liquid.
BI-RC12	Nominal 12 mm OD round glass cell, polyethylene cap.
BI-LRM	Laser rail and mounts for most lasers. Lasers are frequently supplied by the user.
BI-RC27	Nominal 27.5 mm OD dilution vials, package of 100 with HDPE screw caps.
BI-SFS	Sample filtration system provides a fast and convenient way to clean your light scattering samples.
BI-APDx	High quantum efficiency avalanche photodiode detector, up to 30 times the sensitivity of a standard photomultiplier tube.

Options

BI-SCG	10 mm path length glass square cell & PTFE cap.
BI-RC25	Nominal 25 mm OD round quartz cell, dual Teflon tops, mounting ring.
BI-PA	Polarizing analyzer, Glan-Thompson prism, 5 x 10^{-6} extinction, 2 position mount.
BI-CrossCorr	Eliminates detector artifacts by cross correlation.
BI-SVC	Small volume cell for precious samples.
BI-Spec/Adap	Inquire about adapting parts of your existing light scattering systems.

About Brookhaven Instruments

Our talented team of scientists and engineers is dedicated to delivering the most accurate, reliable, and easy-to-use particle characterization instruments on the market. Our modular instrument design allows us to fully customize every aspect of our products, ensuring that our customers receive precisely what they need to meet their research goals. We are continuously improving our products based on feedback from customers, building on our legacy of innovation in particle science.

We strive to act as partners with our customers to ensure they get the most benefit and maximum value from their Brookhaven equipment. We offer extensive post-sale support to educate and empower customers. Whether you have questions about a specific function or are trying to set up a new experiment, our experts will be there to help you every step of the way.

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