

Brookhaven Instruments

Highest Quality Instrumentation for Colloid Science, Particle technology, Laser Light Scattering



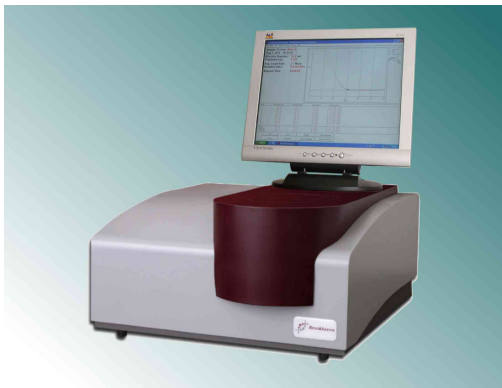
BI-DCP is the instrument of choice for detailed and absolute size distribution information

- high resolution: peaks as close as 10 % apart resolved
- size range: 0.01 to 30 microns; speed: 600 to 15000 rpm
 - LIST and HOST method applicable in one instrument
 - Advanced data presentation: menu driven software and database management
- Based on principles of photo sedimentation in a disc centrifuge, the BI-DCP offers these exceptional features:
 - Rugged and reliable: suitable for use in plant or lab.

BI-XDC is the ideal instrument for QC, QA, research and product formulation

Combining gravitational and centrifugal sedimentation means fast, accurate size distribution across the "one micron" transition.

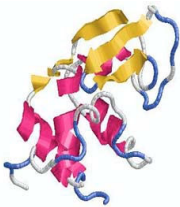
- Scanning X-ray head for speed (8 minutes)
- X-ray detection for high accuracy, no optical corrections needed, quantitative measurements
- Reproducible digitally controlled disk speed
- Merging centrifuge and gravity mode covers a broad size range from 0,01 to 100 microns.



90Plus is the instrument to choose for rapid and reproducible measurements

The BI-90Plus uses scattered light to measure the size of submicron particles suspended in a liquid.

- Size range: 0.002 to 3 microns
- Simple, Fast: automated size distributions in 2 minutes
- Sample QC: gives an index of your sample quality
- Light source: ultra-stable 30 mW
- laser at 637nm wavelength
- Correlator: TurboCorr, multitau, research grade with 510 channels, covering the equivalent of 107 linearly-spaced channels, 100% efficiency, real-time operation over the entire delay-time range.
- Temperature range: -5 to 110 deg C



BI-90PDP and APD: Molecular Weight options for the 90Plus

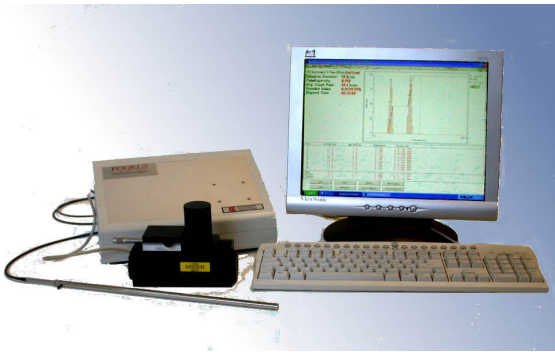
The combination of the APD for detection with the Debye-Plot-method enables the determination of molecular weight with the DLS-system.

- 90PFC - 40µL Flowcell; includes integrated software
- APD detection is about 10 times more sensitive than PMT.

NanoDLS: Nanoparticle sizer from µL-quantities – from 0.5nm radius upwards

- software selection: batch or continuous operation
 - 2.5 µL cell volume; 5.1µL system; recoverable
- measurement in batch or flow mode to 0.5mL/min
 - Change of mode without changing connection
 - light source: ultra-stable 637nm, 35 mW laser
 - electronic laser power regulation by software
 - Correlator: TurboCorr, multitau, 522 channels
 - biochemically compatible materials
 - three different software options incl. ParSEC





FOQELS is sophisticated and powerful enough to be used by R&D to study particle concentrations effects

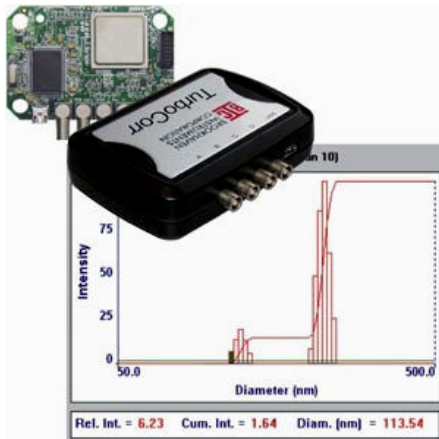
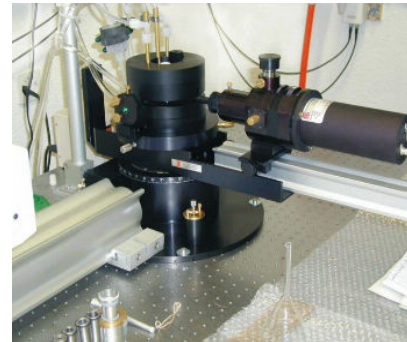
This particle size analyzer allows on-line measurements to be made over a much wider range of concentrations than standard Dynamic Light Scattering (DLS) systems

- fiber optics: simplifies application of DLS to process control
- concentrated samples: measurement possible from 0.001 to 40 vol% sample
- probe: inherently rugged glass fiber probe can be used in many hostile environments
- sensing point: can be located at considerable distances from the control electronics

BI-200SM Goniometer in combination with the BI-TurboCorr digital high-speed correlator is the most advanced system available

Micelles, microemulsions, vesicles, polymers and other colloidal systems are easily characterized by these systems

- Multiangle Measurements: submicron size information
- Zimm Plots: molecular weight, radius of gyration, second virial coefficient.
- Simple Alignment: easier to learn, adjust and maintain
- Versatile: can be used with a variety of lasers



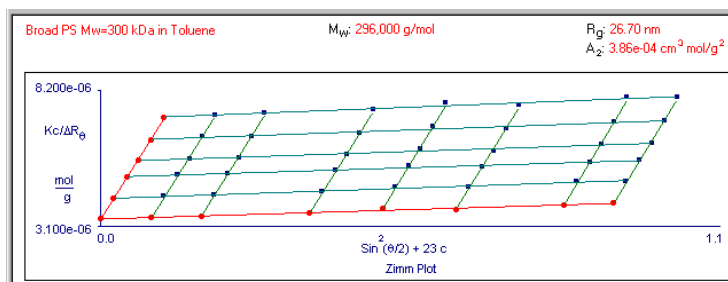
The new BI-TurboCorr correlator is designed for a wide range of uses and an excellent partner for the goniometer setting new standards

When coupled with a goniometer system, ideal for analyzing size distributions and for studying diffusion phenomena and other time dependent physical processes. It is also suitable for the absolute determination of polymer molecular weights.

- Mode: works in auto-correlation and cross-correlation
- Channels: up to 510 channels, software selectable
- linear or constant ratio spacing or individual time points recalled from user files
- Sampling times: 25nsec to 40 ms
- Delay Range: 25ns to 1310 seconds
- Count rate history
- 100% efficient, real time operation over entire range
- Up to eight cards addressed simultaneously by one key stroke

BI-MwA Molecular Weight Analyzer

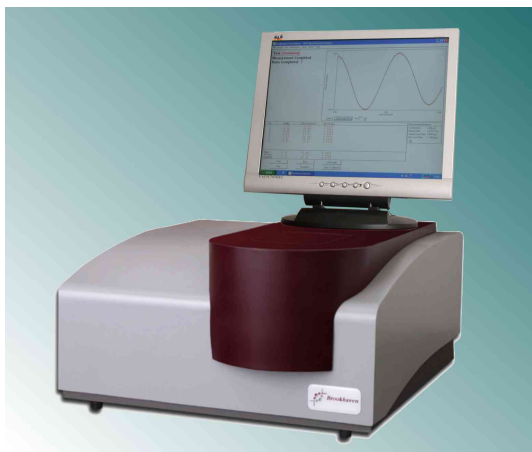
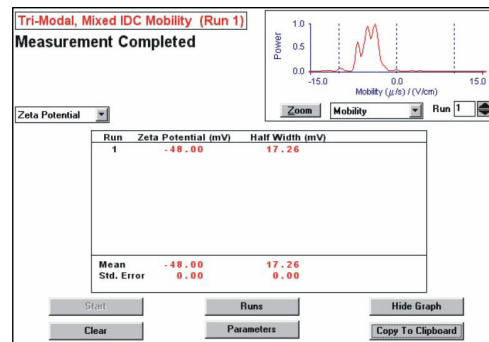
- Multi-Channel-laserlight-scattering detector for GPC/SEC or as stand-alone unit (Zimm-Plot-analysis)
 - principle: multi angle laser light scattering,
 - PEEK flowcell with 100µL volume
- extremely large measurement range: depending on molecules and dn/dc values from 700Da to 10⁷Da
 - 16 analog input channels with 24bit resolution;
 - optional: Windows Software for GPC regulation
 - Available with temperature control
- optional with analog light scattering detector output



The MwA determines: **M_n, M_w, M_z, R_g, A₂** through detection of laser light scattering from seven angles from 35° to 145°

ZetaPlus is the simplest, most accurate particle electrophoresis system available

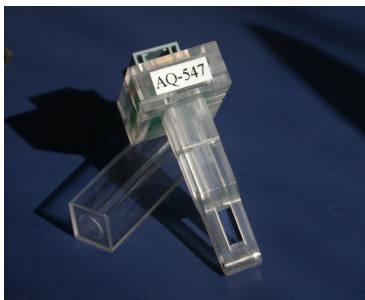
- measures complete Zeta potential/mobility distributions in seconds, including multimodals
 - laser light scattering, homodyne interference
 - light source: solid state diode laser 35mW
- resolution: analysis of the spectral frequency-shift relating to a 250 Hz carrier-frequency; secures highest possible resolution and aids the separation of multimodal dispersions
- recording and on-screen presentation in real time
 - measurement within 15° angle minimises the broadening of the peaks



ZetaPlus/PALS: expanded system for high salt concentrations, high viscosity, close to the isoelectric point, non-polar liquids

- Full functionality comparable to the ZetaPlus
- principle: Phase Analysis of LaserlightScattering
- up to 1000 times higher sensitivity than traditional mobility measurements
- BI-ZetaPALS actually measures in full PALS Mode and not only for correction of the otherwise existing osmotic streaming when capillaries are used therefore it comes with special PALS Software
- suitable for extremely low mobilities from approx. $10^{-11} \text{ m}^2 \text{ V}^{-1} \text{ s}^{-1}$
- Range of conductivity: 0 to 20 S/m
- Particle size range for the measurement of zeta potential depending on sample material from 5nm to approx. 30µm

The Brookhaven ZetaPotential electrodes



- Electrode design with a homogenous field; therefore no electro osmotic effect and no adjustment necessary
- Electrode material: either Gold or Palladium
- Electrodes for aqueous suspensions or organic solvents
- use of affordable disposable plastic cells or quartz cells
- 300µL low-volume quartz cell



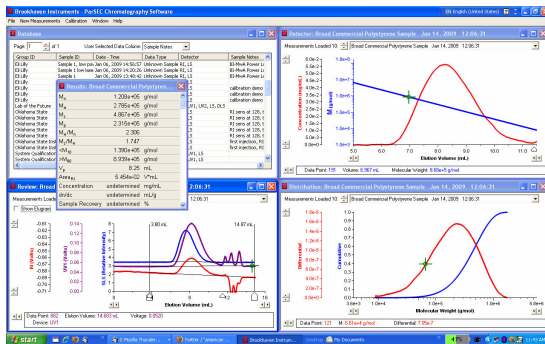
Brookhaven BI-ZTU Titration Unit

- Direct connection to BI-ZELF flow-electrode within the Zeta Potential analyser (ZetaPALS) sample compartment
 - 80mL reaction tube ensures a large working range
- four dosage pumps enable simultaneous use of strong and weak reacting liquids (f. ex. acides, bases)
- Transfer of the sample from and to the reacting tube via peristalsis pump, leak proof designed system
 - Sealed, absolutely maintenance-free pH-electrode
- Software integrated within the 32-bit ZetaPALS system
 - Easy connection and handling due to the use of commercially standardized fittings
 - Delivered completely including software, extensive accessories and BI-ZELF flow-electrode



The new Brookhaven BioDLS for fully automated size measurements

- ☑ extremely small, recoverable cell volume of just 2µL leading to high cost efficiency
 - ☑ high throughput of 36 samples per hour
- ☑ automatic processing of up to 768 samples within a run, therefore convenient over night working possible
- ☑ processes up to two trays of 12, 48, 96 or 384 wells
 - ☑ transfer of sample to and from measurement cell with piston pump system, automatic wash cycle
 - ☑ minimal handling requirement leads to optimal safety for lab personnel and valuable sample material
- ☑ only bio-compatible materials in contact with sample
 - ☑ samples can be protected by purging with inert gas
 - ☑ independent temperature control of measurement cell and sample storage; external TE cooler available
 - ☑ special, efficient wash cycle, even copes with highly viscous sample materials
- ☑ choice of 35mW/637nm or 30mW/850nm laser



ParSEC GPC/SEC Chromatography Software

The new solution for chromatography that looks for absolute particle size and molecular weight, efficiently handles MALLS and DLS detectors

- intuitive – comprehensive – flexible
- conventional or universal calibration methods
- multiple detector capabilities: RI – UV – size – viscosimetry – absolute molecular weight
- all expected and necessary functions

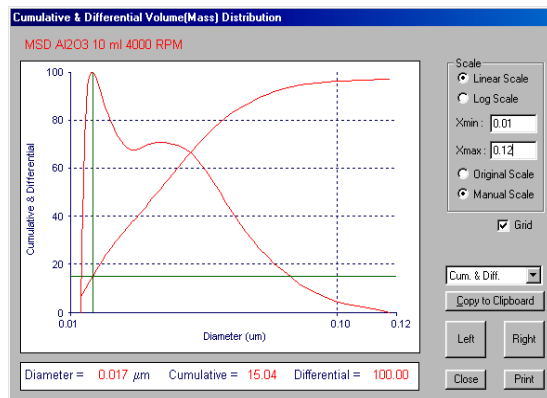
How to choose the correct particle size analyzer

Applications - Criteria - Advantages - Constraints

Measurement range: an important limit is the range around 1µm
 - dividing line between sedimentation and centrifugal sedimentation
 - border between dynamic light scattering and Fraunhofer diffraction
 - end of the optical microscopy

Weighting: according to interpretation the allocation gets weighted as number, volume or weight, maybe as surface

Information content: next to average size distribution (mean and width) or multi-modality could be of interest



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