

# MACROIMS MACROION MOBILITY SPECTROMETER MODEL 3982

HIGH RESOLUTION SIZE  
AND MASS ANALYSES

The MacroIMS™ Macroion Mobility Spectrometer is an instrument designed for rapid, high resolution size and mass analysis of large proteins and their agglomerates, viruses and virus particles, lipoproteins, nanoparticle colloids, and other macromolecules. The power of the MacroIMS Macroion Mobility Spectrometer is its ability to analyze macromolecules and nanoparticles that are too large for mass spectrometry, with a level of accuracy and resolution not achievable with light scatter-based detectors. Increase productivity of experimental workflow with the optional autosampler system. The MacroIMS Macroion Mobility Spectrometer is a powerful complement to liquid chromatographic, FFF, and AUC separations and mass spectrometry analyses.



## Features and Benefits

- + Mass analysis from 8kDa to >100 MDa – analyze macromolecules and nanoparticles too large for mass spectrometry
- + Size analysis down to 2.5 nm – accuracy and resolution not achievable via light scatter-based detectors
- + TSI macroion mobility technology – accurate quantification of multi-modal distributions, independent of solute/solvent optical properties
- + Automated analyses – direct connection to LC pumps and autosamplers
- + Soft x-ray ionization – radioactive-free charge neutralization
- + Automated sample handling – high-throughput analyses
- + Chromatography-based software – enhanced data processing capabilities

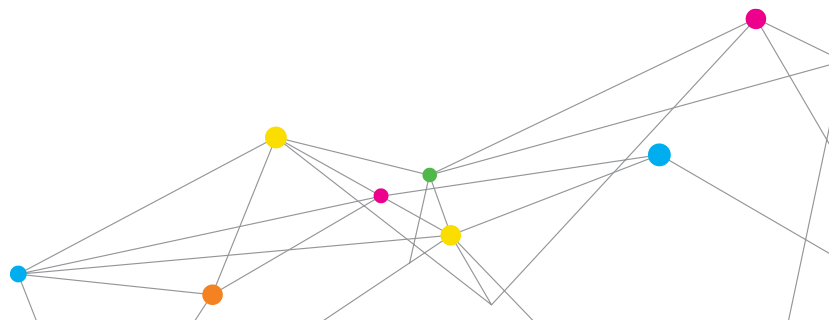
## Applications

The MacroIMS Macroion Mobility Spectrometer can be used for many applications:

- + Characterization of antibody aggregation
- + Lipoprotein fractionation
- + Virus, vaccine, and VLP analyses
- + Aqueous polymer size studies
- + Macromolecule size analysis
- + Nanoparticle sizing
- + Protein-protein interaction studies
- + Pharmaceutical R&D



UNDERSTANDING, ACCELERATED



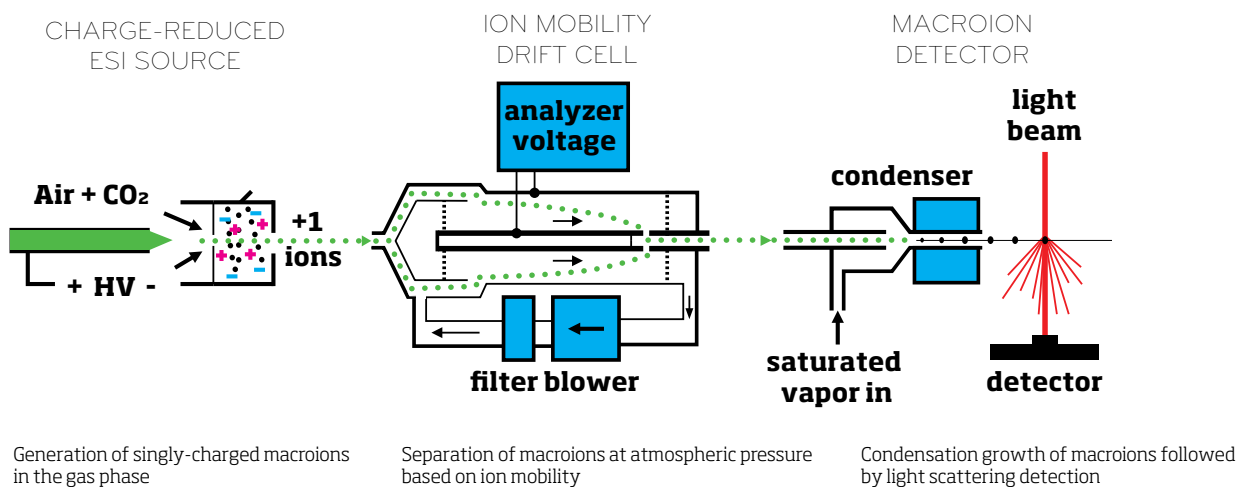
# MACROION MOBILITY SPECTROMETER – TRUSTED TSI TECHNOLOGY FOR MACROMOLECULE ANALYSIS

The MacroIMS system uses nanoelectrospray ionization (nano ESI) to convert solution-phase analytes into gas-phase macroions. Nano ESI is accomplished using a fused silica capillary, applied high voltage, and sheath gas to create a stable Taylor cone.

The multiply-charged ions that are generated in the nano ESI process are charge-reduced to a repeatable, known charge distribution using a safe soft x-ray source. Resulting +1 charge state macroions are transported to the ion mobility drift cell, where they are separated via their electrical mobility, a first principle function of size.

The macroion detector is used to quantify macromolecules of a given mobility. The detector works by condensing a vapor onto the macromolecules to form liquid droplets. These droplets are large enough to be counted individually when they pass through a laser and photodetector assembly.

Advanced chromatography-based system software allows for automated data acquisition, data processing, and instrument control of the MacroIMS system. Audit trail and electronic signatures are also enabled by this 21 CFR Part 11-certified software package.

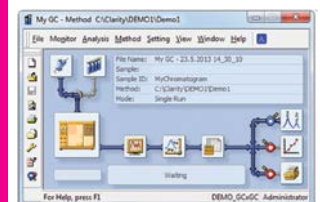


## WORKFLOW USING THE MACROIMS MACROION SPECTROMETER

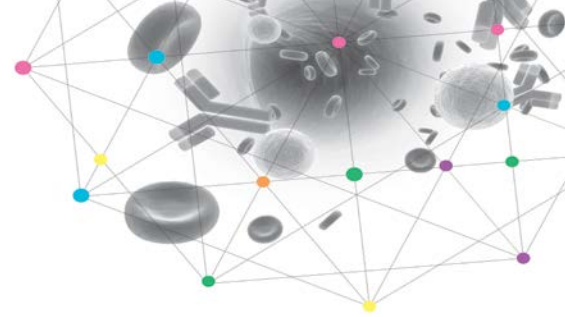
### 1. Prepare Sample



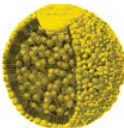
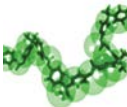



### 2. Create a Method



# MACROION MOBILITY SPECTROMETER APPLICATIONS

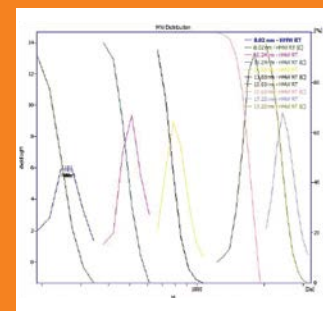
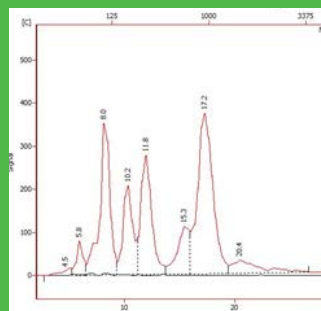
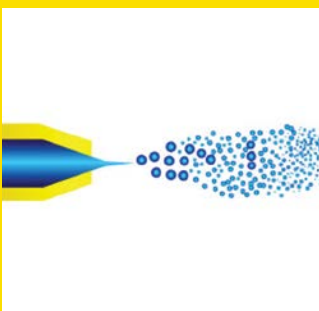


	Applications	Traditional Methods	Advantages of MacroIMS System
	<b>Antibody Aggregate Characterization</b> Monitor and analyze sub-visible protein aggregation, and its effect on biological product manufacturability, bioactivity, absorption rate, and immunogenicity.	+ Analytical ultracentrifugation (AUC) + Field flow fractionation (FFF/AF4) + Size exclusion chromatography (SEC) + Dynamic/multi-angle light scattering (DLS/MALS)	+ Study antibody aggregates and conjugates from 8 kDa to over 25 MDa in mass + Readily differentiate antibody fragments + Quantitative concentration measurements + High sensitivity analyses
	<b>Virus, Vaccine, and VLP Analysis</b> Analyze particle size distributions of viruses and virus-like particles, and assess concentration and purity at various stages of product processing.	+ TEM/SEM + Plaque assay + FFF/AF4-MALS + Light scattering + AUC	+ Resolve mixtures of intact and partially degraded virus particles + Accurate total virus number concentration aids in determining infectivity ratios + Fast time-to-results (analyses in < 3 min.)
	<b>Lipoprotein Fractionation</b> Measure size and distribution of lipoprotein subfractions including VLDL, LDL, HDL, and chylomicrons.	+ AUC + Gradient gel electrophoresis + SEC + 2D electrophoresis + Mass spectrometry (MS)	+ Accurate size distribution of subfractions without calibration + Direct measurement of number size distribution + Quantitative concentration measurements + Fast time-to-results
	<b>Polymer Sizing (Aqueous)</b> Determine molecular weight and size distribution of aqueous natural and synthetic polymers.	+ Gel permeation chromatography (GPC) + Light scattering + MS + Viscosity analysis	+ More accurate for the MW ranges involved + Small sample volumes + Fast time-to-results
	<b>Nanoparticle Sizing</b> Determine particle size distribution of hard and soft materials 100 nm or smaller.	+ TEM/SEM + Light scattering + Nanoparticle Tracking Analysis (NTA) + AUC + FFF/AF4	+ Direct measurement of number size distribution + Analyses independent of optical properties of analyte and solvent + Quantitative concentration measurements + Suitable for hard and soft nanomaterials + Fast time-to-results

## 3. Run an Experiment

## 4. Collect Data

## 5. Analyze Data



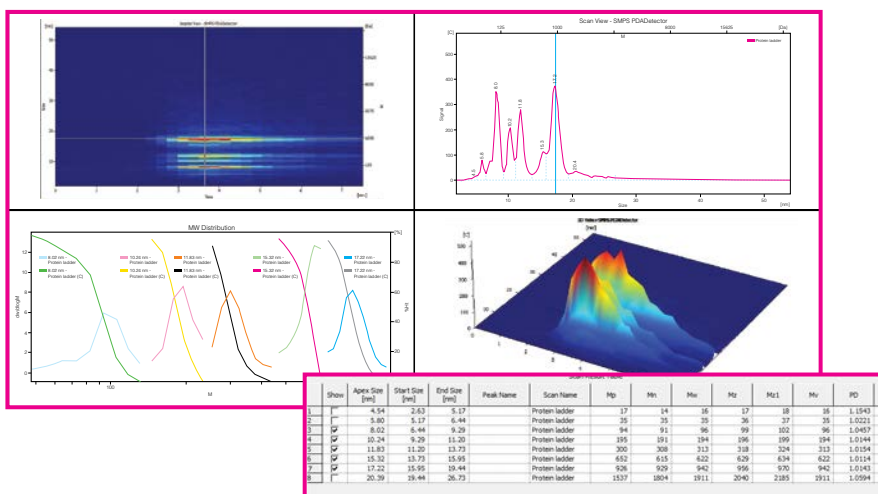
# SPECIFICATIONS

## MACROIMS MACROION MOBILITY SPECTROMETER MODEL 3982

### Advanced Macromolecule Analysis

MacroIMS Mobility Spectrometer Software is a powerful tool for the elucidation of biomolecule and nanoparticle mass and size information

- + Intuitive chromatography-based software for ease-of-use and fast time-to-results
- + Powerful data processing tools simplify data interpretation and communication of results
- + Control multiple autosampler/pump systems for maximum sample loading flexibility
- + Data export feature and LIMS connectivity streamline sample submission and result outputs
- + Advanced security features, audit trails, and electronic signatures to meet 21 CFR Part 11 and GLP compliance requirements



Streamline data analysis and optimization using MacroIMS Mobility Spectrometer Software

### Operational Specifications

Mass Range	8 kDa to >100 Mda
Size Range	2.5 nm to 150 nm
Mass Resolution	R ~7-10 (m/Δm; Δm = FWHM)
Reproducibility	+/- 5%
Scan Time	<15 seconds to 300 seconds user-defined
Sample Consumption	<250 nL (native sample)
Liquid Conductivity	0.2 S/m nominal
System Operating Pressure	Atmospheric

### Physical Specifications

Charge Reduction	Soft x-ray
Power Requirements	100-230 VAC, 50/60 Hz
Footprint Area (without autosampler)	18 x 27 in (44 x 68 cm)
Total Weight	57 lbs. (26 kg)
Operating System	Microsoft® Windows® XP, Vista, 7, and 8
Gas Requirements	CO <sub>2</sub> : 15 psig; filtered dry air: 25 psig

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### To Order

Specify	Description
3982N88	3982 MacroIMS System. Includes Electro spray, Electrostatic Classifier, Nano DMA, 3788 water CPC, MacroIMS software
3982N76	3982 MacroIMS System. Includes Electro spray, Electrostatic Classifier, Nano DMA, 3776 butanol CPC, MacroIMS software
3482	Advanced Electro spray Generator
3982-Auto	MacroIMS Autosampler System
3982-AutoC	MacroIMS Autosampler System, with temperature control
3982-SW	MacroIMS Software



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