

Bruker **Daltonics**



apex[®]-ultra

- High-end Performance Hybrid Qq-FTMS

think forward

Qq-FTMS

The Ultimate Platform for the Most Challenging Samples



apex-ultra provides definitive answers for any analytical laboratory by delivering:

- Unmatched Mass Accuracy
- Enhanced Selectivity and Dynamic Range with CASI™ technology
- The Ultimate in Resolution
- Outstanding Sensitivity
- Expansive Mass Range
- Fast Data Acquisition

The new apex-ultra hybrid Qq-FTMS combines cutting edge FTMS technology with a unique hybrid Qq front end to provide top-down selectivity and unrivalled MS/MS. It delivers the most accurate, highest resolution and broadest dynamic range information available for pharmaceutical library compound and natural product identification, drug distribution studies, proteomics research, and other complex analyses such as metabolomics and petroleomics.

These capabilities exist in a package that is optimized for easy use, and with pricing that's affordable-without compromising performance. Control of the apex-ultra is seamlessly integrated with the entire Bruker Daltonics instrument family, all of which operate utilizing Compass™, the most powerful and flexible MS control software environment available today.

Common Applications for the apex-ultra

- Compound Elucidation
- Drug Impurity Analysis
- Natural Product De-Convolution and Characterization
- Petroleum Product Analysis
- High End Proteomics Studies
- Metabolomics Research
- Molecular Imaging of Tissue Distribution of Biomarkers, Drugs and Metabolites
- Protein/Protein or Protein/Ligand Interactions



● Sample Analysis with Absolute Confidence

With the apex-ultra, high quality, exact mass measurements are only a mouse click away. Sub-ppm levels of mass accuracy are routine for both intact molecular analysis by MS, and structural characterization via MS/MS. This level of confidence is readily achieved without internal standards or recalibration. The combination of outstanding hardware performance with powerful data analysis software (SmartFormula3D™) further validates the elemental composition and molecular formula of the molecule of interest.

High End Performance for any Analytical Laboratory

FTMS is synonymous with the ultimate in analytical capability due to its ultra high performance and versatility. In the past, this power came with onerous complexity. Now, the apex-ultra brings the capability to generate detailed structural and functional information to laboratories on an everyday, easy to use platform. No longer the realm of just the "Mass Spec Specialist" or the Core Facility, the apex-ultra brings phenomenal analytical power to any analytical laboratory.

CASI for Rapid, Enhanced Selectivity and Dynamic Range

The apex-ultra also provides the capability to utilize CASI (Continuous Accumulation of Selected Ions) for the enrichment of low abundant species for MS and MS/MS. CASI provides a very high degree of enrichment for trace components of interest in even complex mixtures. Unlike other general analytical analysis techniques, this capability makes it possible to truly isolate and amplify the signal from the trace components of mixtures that are often the most important or most interesting.

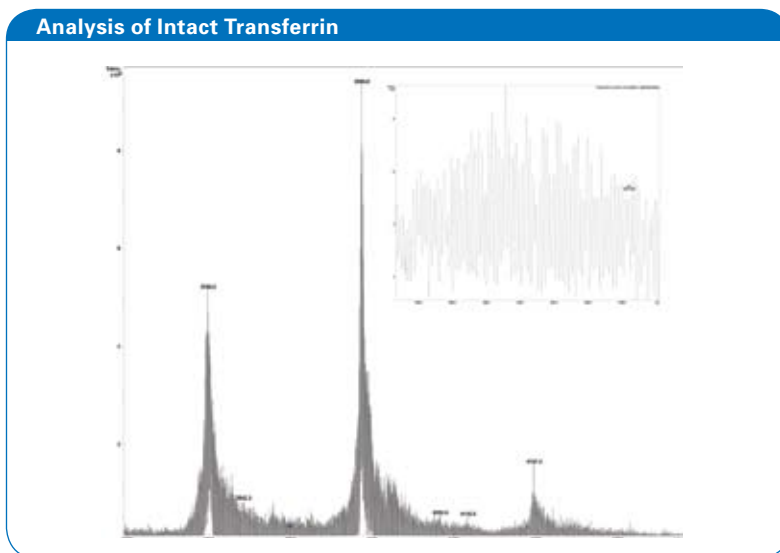


Figure 1: Transferrin native state – q isolated with inset showing isotopic detail of the 20+ charge state at m/z 3966

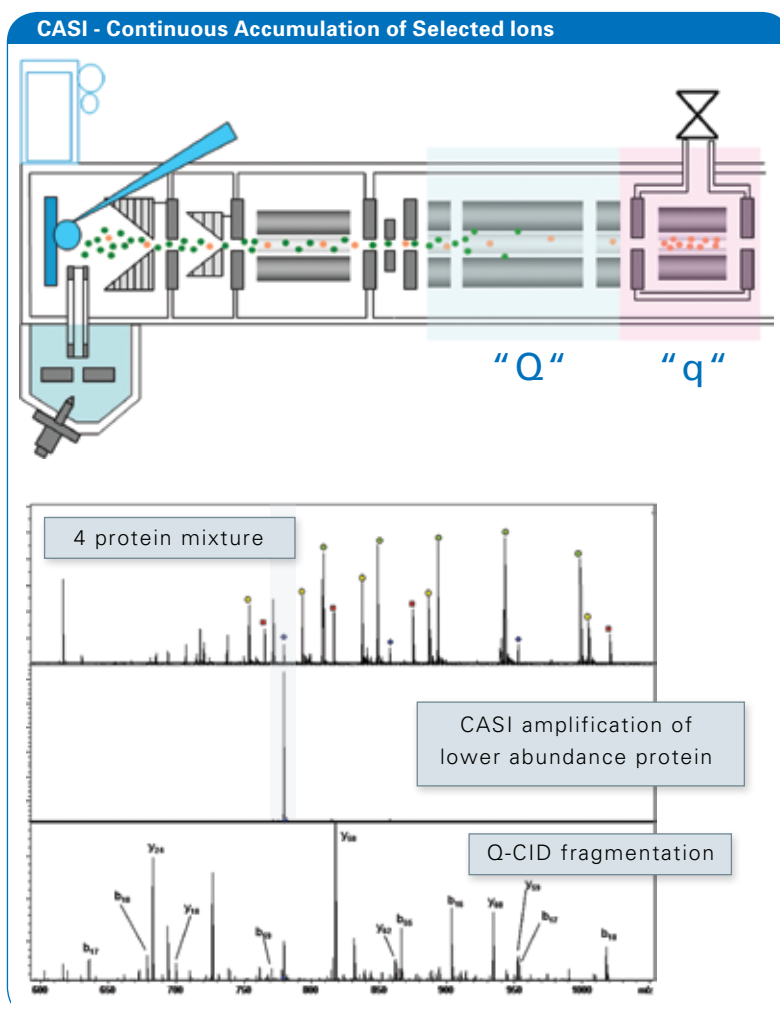
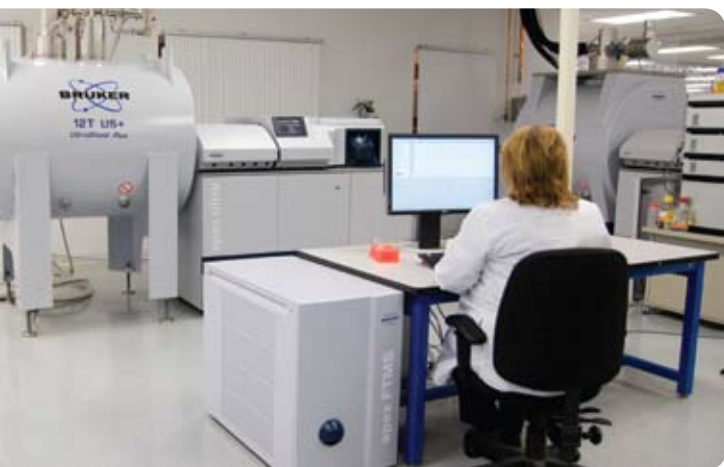


Figure 2: Isolation and amplification of low abundant signal with CASI

● Ultimate in Resolution

Innovative Technology Drives Instrument Performance

The apex-ultra features improved mass accuracy and resolving power through the development of tailored, low noise detection electronics. These electronics, combined with Bruker's patented Infinity™ analyzer cell and unique Sidekick™ ion accumulation system, deliver unparalleled results. The new apex-ultra is capable of sub-ppm mass accuracy and possesses resolving power of greater than 900,000. Even higher resolving power and better mass accuracy capabilities are available at larger magnetic field strengths. The apex-ultra also includes improved Q-q-electronics for extended mass range performance from m/z 100 to m/z 10,000. Extending the mass range for ion transmission addresses a wider range of applications, such as the investigation of non-covalent complexes.



Nanobay™

Fast Data Acquisition For Today's Separation Techniques

The apex-ultra data acquisition rates have been significantly increased with the introduction of the new Nanobay™ console. This console incorporates asynchronous data pipelines for FTMS data acquisition faster than one spectrum per second, with resolving power of greater than 100,000. These enhancements make the instrument suitable for LC-FTMS and LC-MS/FTMS applications.

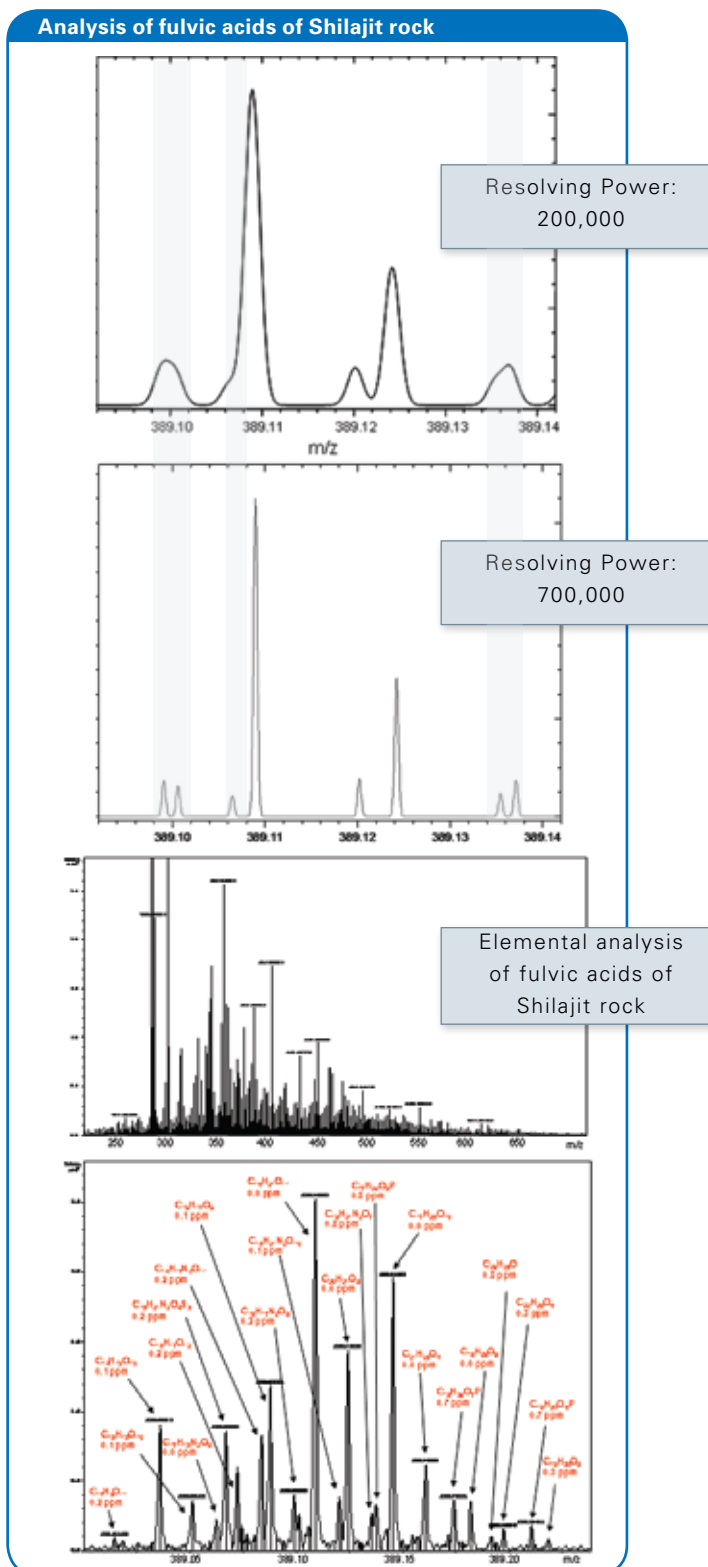


Figure 3: Elemental analysis of fulvic acids of Shilajit rock showing the resolving power of the apex-ultra

● Hybrid Qq-FTMS' Unique Features

The apex-ultra leverages the complimentary nature of traditional Collisional Induced Dissociation (CID) and Electron Capture Dissociation (ECD) to provide unique tools for probing post translational modifications and structural interrogations of intact proteins and their modifications. Precise answers to key questions are often facilitated by exact mass to the sub ppm level. In addition, FTMS, with its ultra high resolution, succeeds in analyzing complex matrices and small molecule or protein samples where other techniques simply fail.

Ion Source Flexibility

While FTMS is ideally suited to liquid introduction, atmospheric pressure ionizations techniques such as Electrospray (standard), APCI, and Nanospray, Bruker Daltonics now offers a unique dual ESI/MALDI source based on patented Ion Funnel technology. This unique technology effortlessly gives users the ability to switch to and from ESI and MALDI ionization with just the touch of a button. The intermediate pressure MALDI source offers exquisite sensitivity, and preserves parent ion fidelity throughout the complete FTMS detection process.

A Key Part of an Integrated Protein Analysis Solution

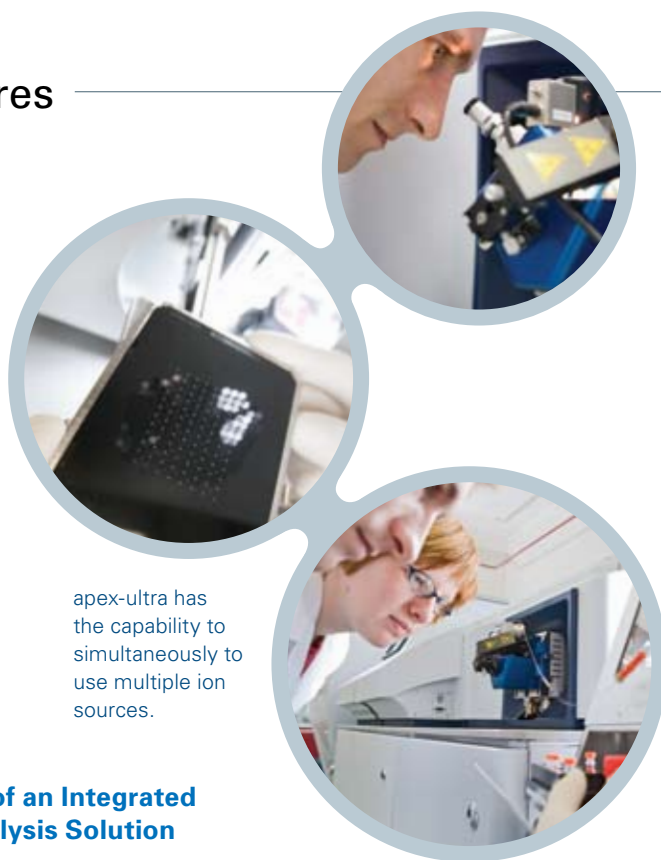
By integrating the flex series MALDI TOF standard microtiter plate target design, users have immediate access to our patented Anchorchip™ technology for a 10–100x sensitivity boost over standard plate technology for small proteins, peptides or small molecule analysis. Utilizing either 96, 384 or 1,536 sample spots/plate, and full compatibility with our Proteineer suite of automated sample preparation robotics, small protein or peptide samples can be completely processed from gel to MALDI plate spotting.

apex-ultra has the capability to simultaneously use multiple ion sources.

Refrigerated, Low Maintenance Magnet Choices

Our active cooling refrigeration technology has enabled us to design and build Nitrogen-free compact superconducting magnets with very low Helium losses to minimize instrument maintenance and service. These magnets also include actively shielded technology with up to 15 Tesla magnetic

field strengths. Bruker's patented active shielding technology minimizes the stray magnetic field levels for maximum laboratory safety and compatibility. The successful combination of our magnet technologies has enabled us to offer versions of apex-ultra at 7, 9.4, 12, and now 15 Tesla field strengths.



● Pioneer in Molecular Imaging

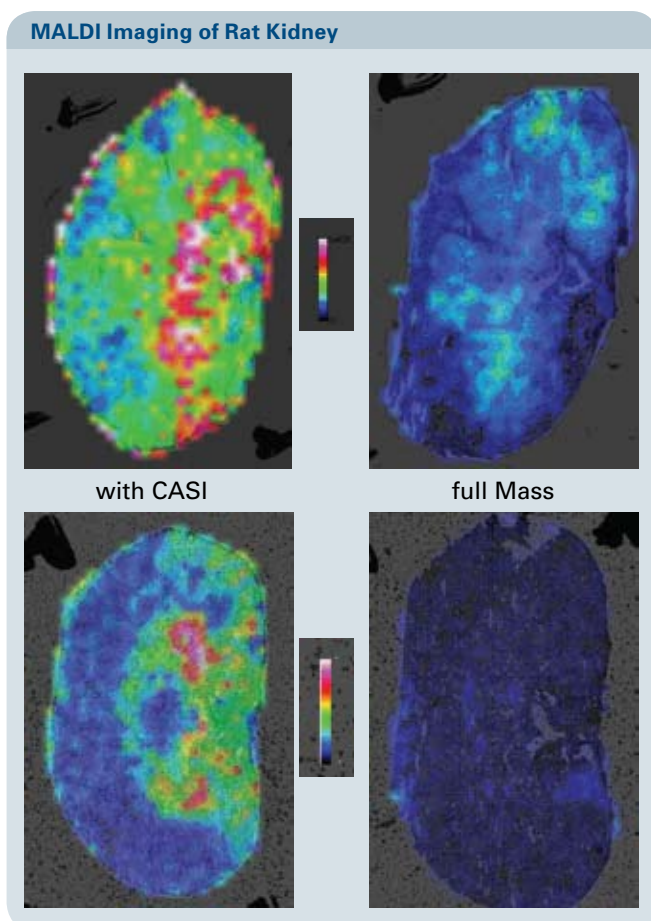


Figure 2: Normalized intensities for Olanzapine signals for 2 hours (top) and 6 hours (bottom) post dosage tissues, respectively.

Read more:

Bruker Daltonics
Application Note FTMS-37.
High Resolution Molecular Imaging of
Pharmaceuticals at Therapeutic Levels

A Pioneer in Molecular Imaging

One of the most innovative and exciting applications of Mass Spectrometry in any field today is the use of high performance Mass Spectrometers for the imaging of proteins, peptides, and biomarkers, drugs and even their metabolites in tissue sections. The implications of being able to study these key players in disease and pharmaceutical therapies has the potential to unlock a vast array of information and greatly increase our understanding in a number of disease and therapeutic areas.

Bruker Daltonics has led the way in utilizing MALDI TOF or TOF/TOF styles of instruments for studying protein or peptides in tissue sections. MALDI types of instruments are well suited to the studies of these larger molecules. The apex-ultra complements the traditional MALDI style instruments for the study of biomarker and small molecules, especially for therapeutic dose levels of drugs and their metabolites."

Now, the apex-ultra has broken the bottleneck in Molecular Imaging by Mass Spec and can utilize its performance capabilities to study these small molecules at relatively low levels in a variety of tissues. This capability makes the apex-ultra the platform of choice for analyzing the distribution of small molecule biomarkers or drugs and their metabolites at therapeutic doses. A must for DMPK/ADME-Tox laboratories or Pharmacology groups, the apex-ultra can easily and simply provide levels of information today far beyond the capabilities of other older techniques or lesser performing instruments.

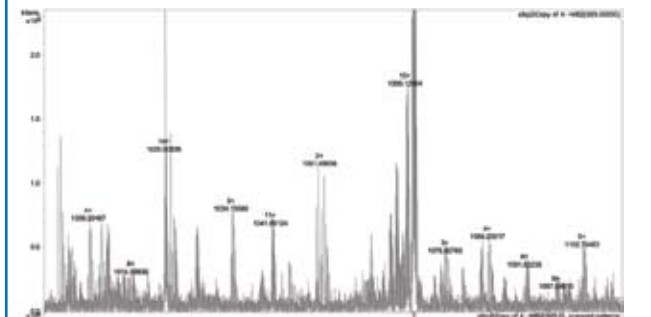
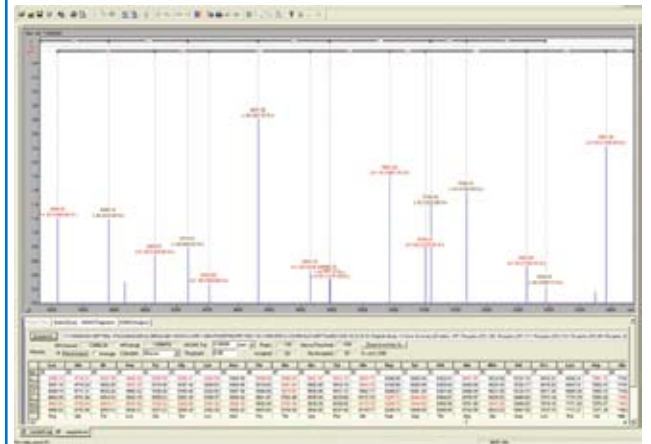
● Top Down Superiority

Comprehensive Top-Down Proteomics Tools

Top-down proteomics work with the apex-ultra requires unique processing tools that can effectively extract mass information from intrinsically very complex spectra. To facilitate this, the powerful Bruker Daltonics Compass™ software suite now includes:

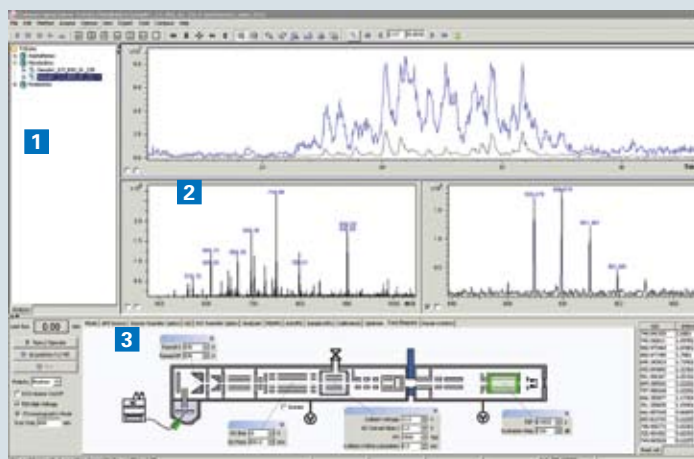
- **SNAP2™**, a peak-picking module that accurately determines and extracts monoisotopic mass information from high resolution data for large proteins and protein fragments
- **MaxEnt**, a charge deconvolution method that is based on the popular Maximum Entropy algorithm for accurate and complete account of charge to produce a neutral-based mass spectrum
- **BioTools™** for de novo sequencing, sequence annotation, and evaluation of results from protein database searches, e.g. using MASCOT

High resolution protein sequencing



SLBP SNAPII data versus raw data

Compass Software Platform



Common to all Bruker Daltonics' Mass Spec platforms, the Compass operating software environment, a customized selection of modules, will serve your system configuration and application requirements. With Compass, if you have ever used any other Bruker instrument, you'll require minimal training to use the apex-ultra.

- 1) Easy to use data and methods file manager
- 2) Customizable data viewing windows
- 3) Intuitive graphical instrument interface

Technical Specifications

For apex-ultra equipped with 7 tesla magnet; also available with 9.4, 12, and 15 tesla magnets for enhanced performance

Analytical Performance

- Mass Range: 100 – 10,000 m/z (transmission with RF only),
100 – 6,000 m/z (mass selective)

ESI

- Mass accuracy: < 1,0 ppm, m/z range 100 - 1500 (internal),
< 1,5 ppm, m/z range 100 – 1500 (external)
- Resolving Power @ m/z 400: > 900,000 (FWHH)
- Sensitivity (Ubiquitin): S/N > 10:1 for <1fmol (consumed)
- High mass (BSA 0,1mg/ml): S/N > 10:1
- Negative ions: Functionality shown on FibrinopeptideB

ESI Source Options

- Electrospray (standard): (1µl/min – 1 ml/min)
- On-Line Nanospray (standard): (100nl/min – 500 nl/min)
- APCI
- APPI
- Off-Line Nanospray

MALDI (Optional)

- Mass accuracy (LHRH): <1,5ppm (internal), <4,0ppm (external)
- High resolution (Substance P): >1,400,000 (FWHH)
- Sensitivity (Substance P): S/N > 10:1 for <5fmol (loaded)
- Negative ions: Functionality shown on FibrinopeptideB

MS/MS Operation

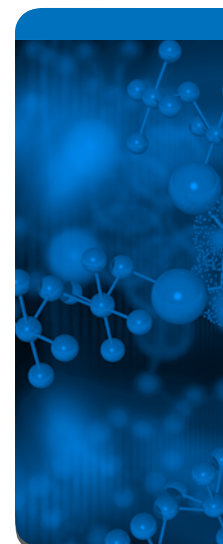
- Isolation efficiency (Qh-Interface): >60% (LHRH)
- MS/MS Efficiency (Qh-Interface): >50% (LHRH)
- Multistage MS (MS3 guaranteed): LHRH MS/MS (collision cell)
-> MS/MS/MS (Infinity Cell™)
- Mass Dependent MS/MS: Automated isolation and MS/MS of the most intense ions in an LC-MS/MS run (scan ratio set to five)
- Sensitivity ECD: S/N > 10:1 for 50fmol (consumed)

Support of:

HPLC and sample inlet systems from the following vendors: Bruker EASY-nLC, Advion TriVersa NanoMate, Agilent, Dionex, VWR/Hitachi, Waters (incl. UPLC), Autosamplers from CTC

For research use only. Not for use in diagnostic procedures.

apex-ultra, CASI, Compass, BioTools, RapiDeNovo and PROTEINEER are trademarks of Bruker Daltonics corporation. MASCOT is a registered trademark of Matrix Science Ltd., EASY-nLC™ is a trademark of Proxeon A/S, Odense, Denmark



www.bdal.com

● **Bruker Daltonik GmbH**

Bruker Daltonics Inc.

Bremen · Germany
Phone +49 (421) 2205-0
Fax +49 (421) 2205-103
sales@bdal.de

Billerica, MA · USA
Phone +1 (978) 663-3660
Fax +1 (978) 667-5993
ms-sales@bdal.com