

LC-MS/MS System

PRESENTED BY

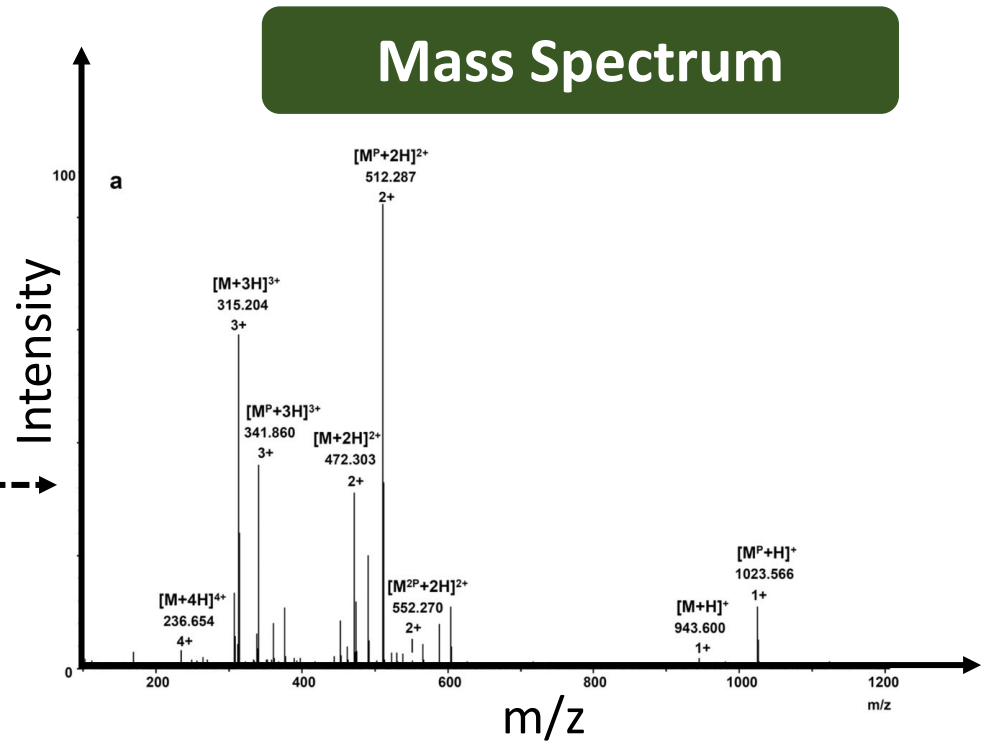
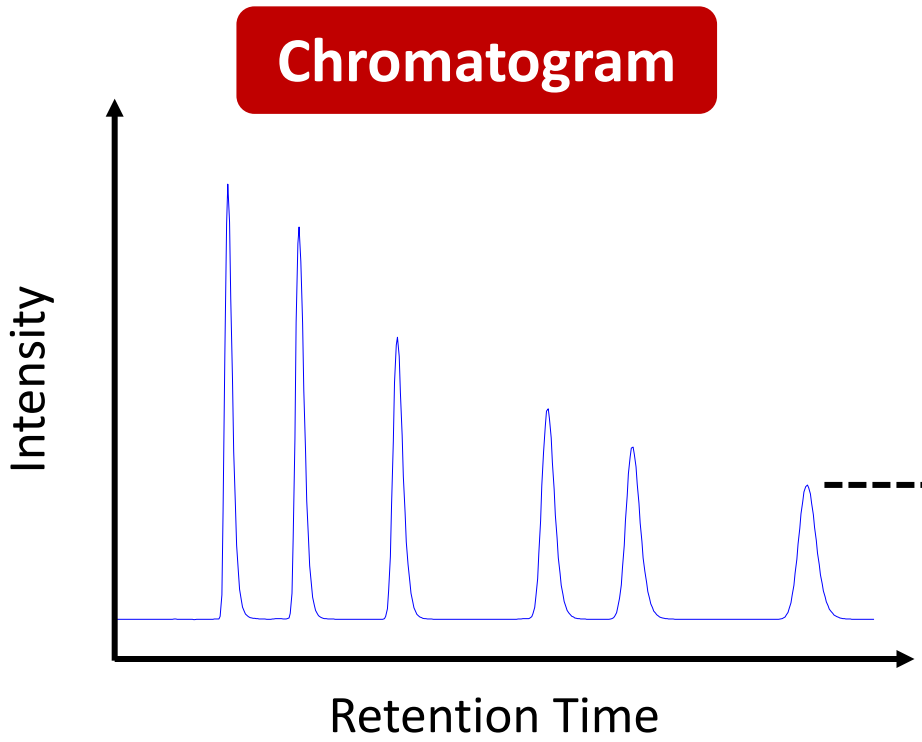
Boontariga Wongsra

LCMS Product Specialist

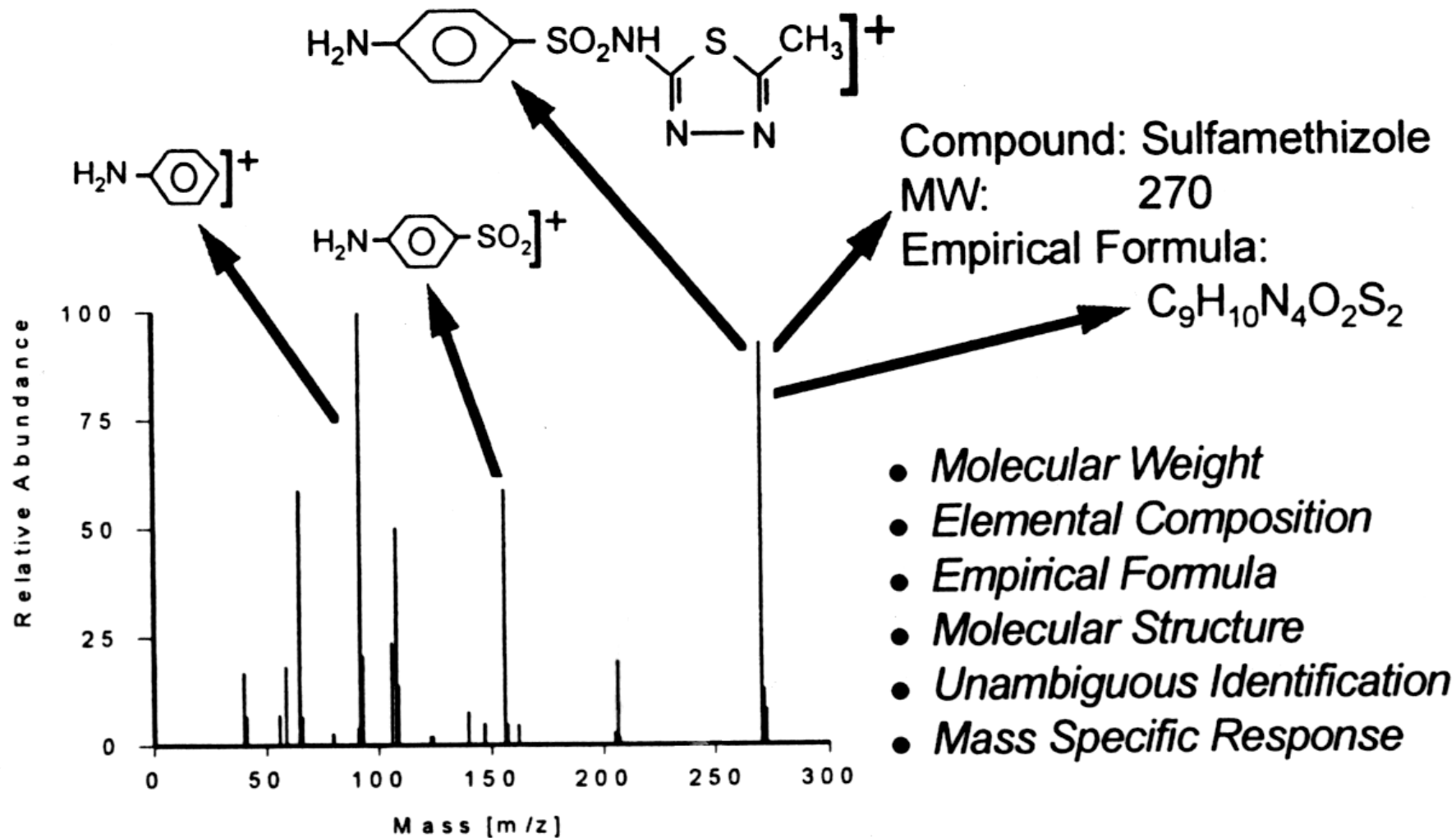
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Mass Spectrometry – Block Diagram



Mass Spectra – Information Rich Data



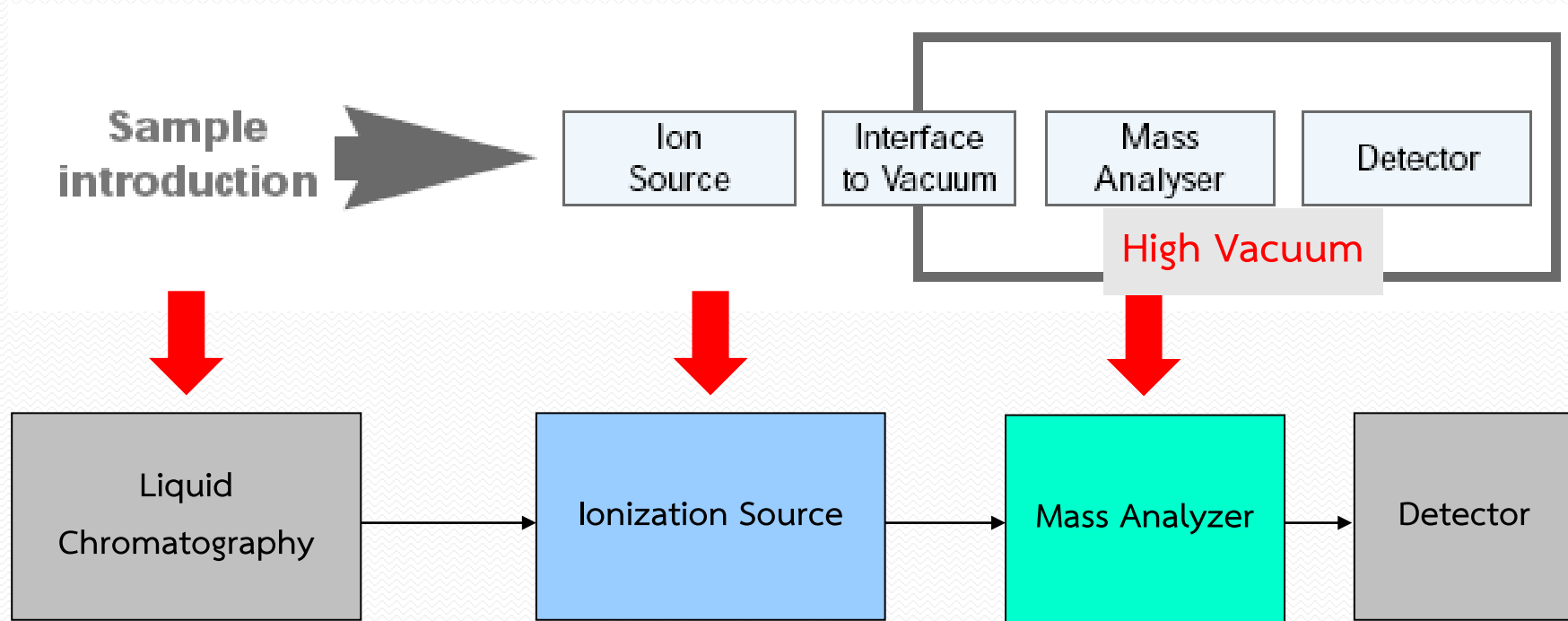
Mass Spectrometry – Block Diagram

Thermo Scientific™
Vanquish™
UHPLC System



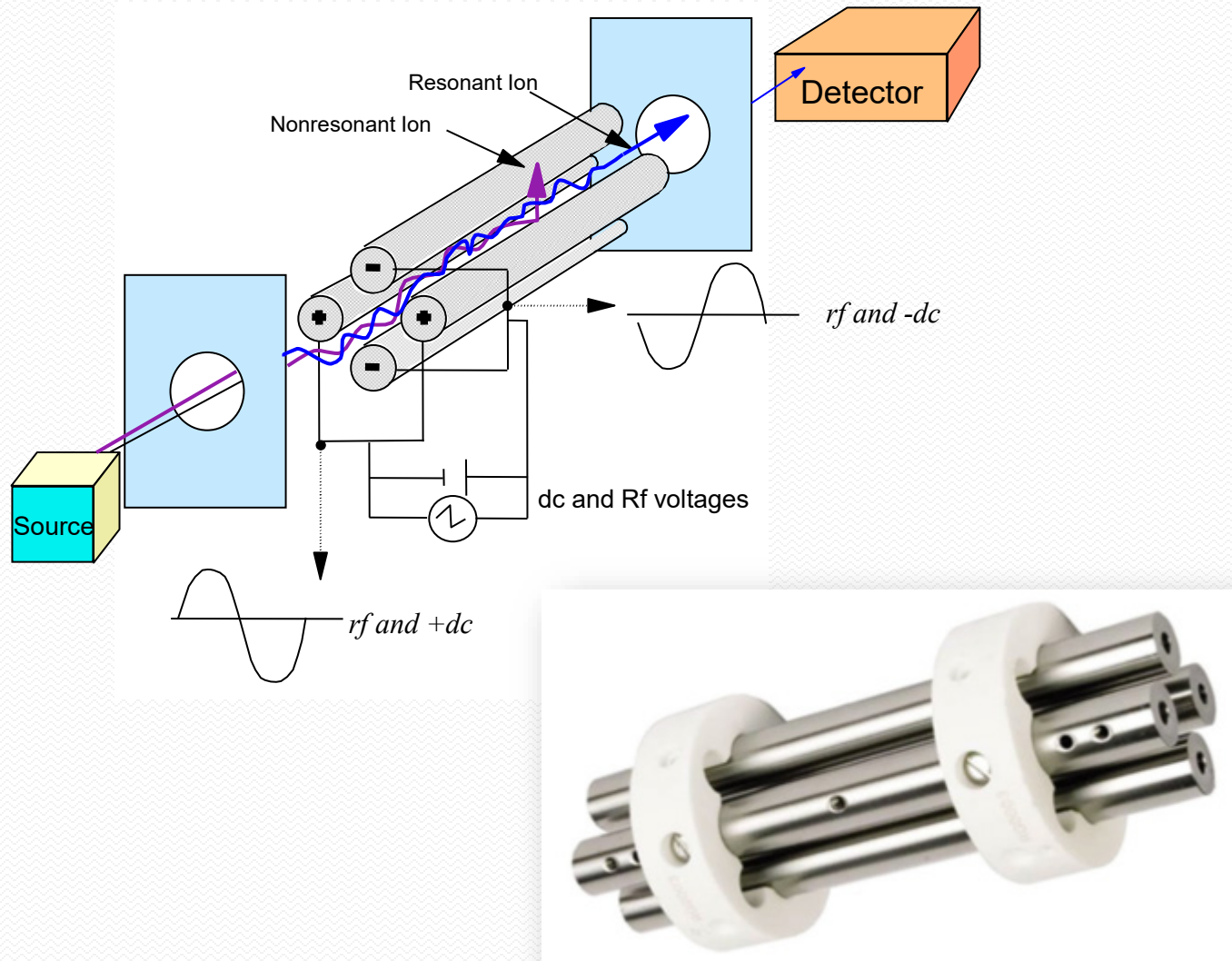
Thermo Scientific™
TSQ™ Series
MS/MS System

LCMS – Block Diagram



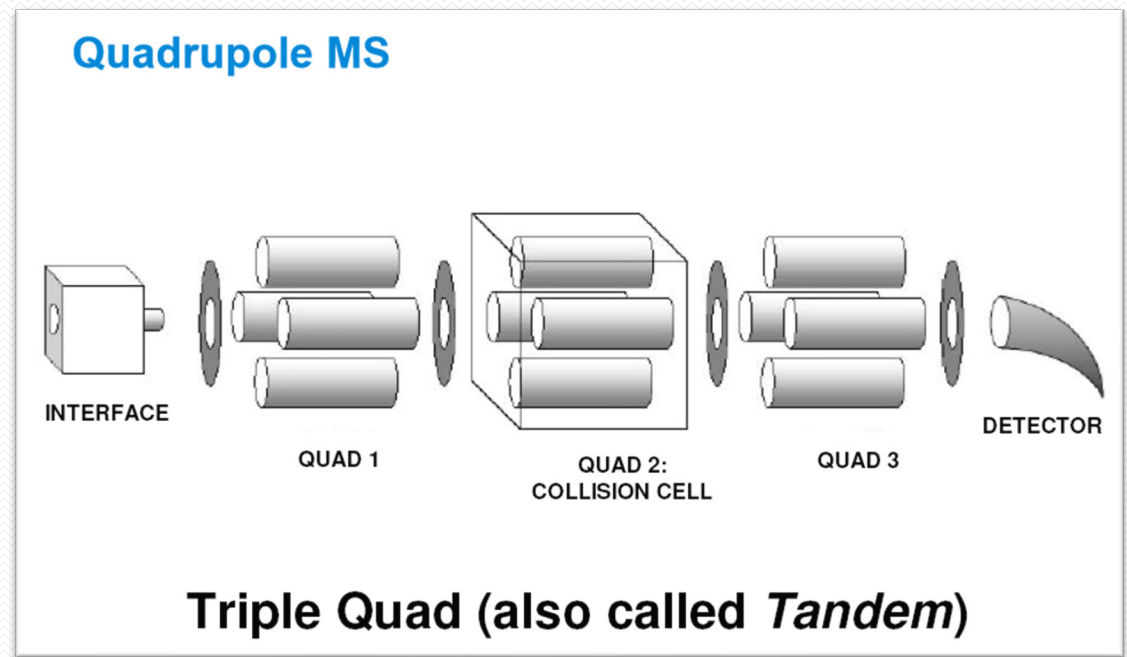
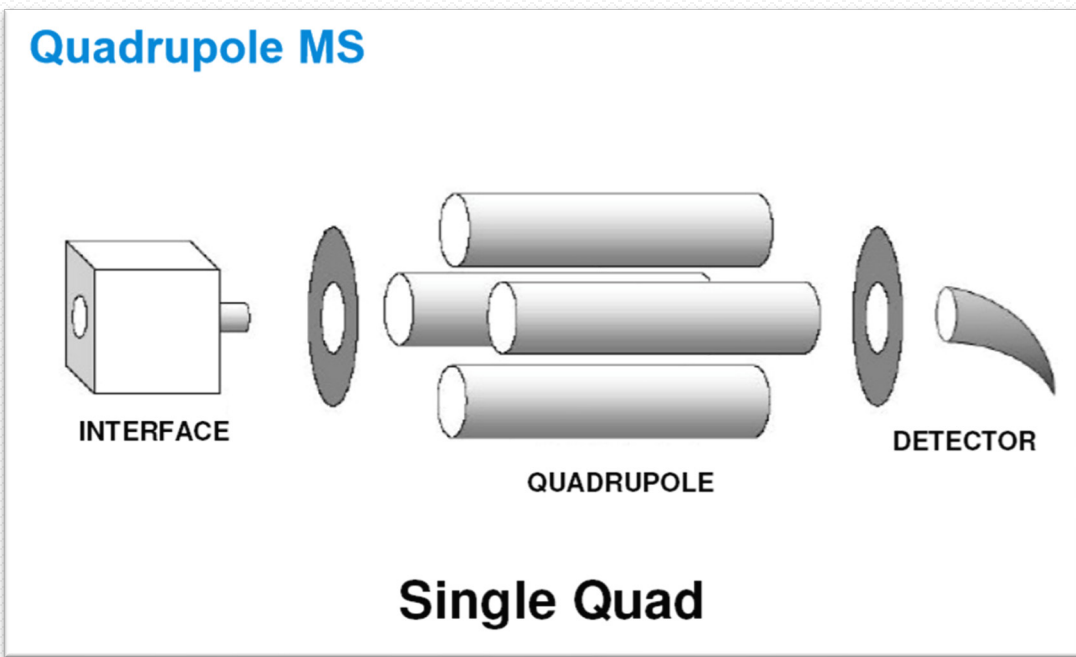
- Ion-Traps
- Triple Quadrupoles
- Time-of-flight
- Orbitrap

Mass Analyzer : Quadrupole

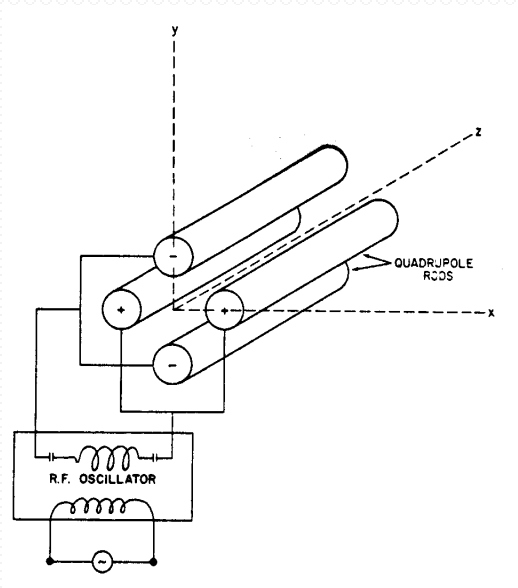
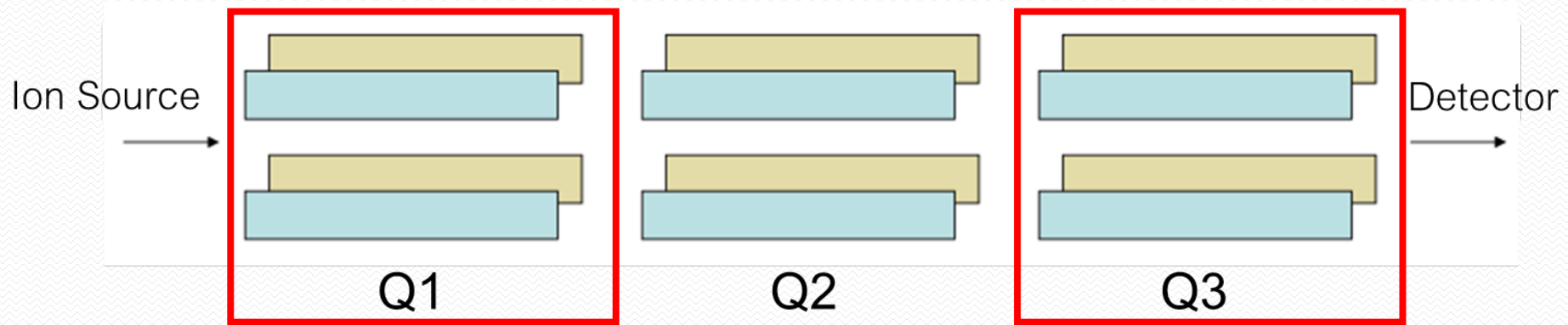


- Uses a combination of RF and DC voltages to operate as a mass filter.
- Has four parallel metal rods.
- Lets one mass pass through at a time.
- Can scan through all masses or sit at one fixed mass.

Quadrupole \rightarrow Triple Quadrupoles (QqQ)



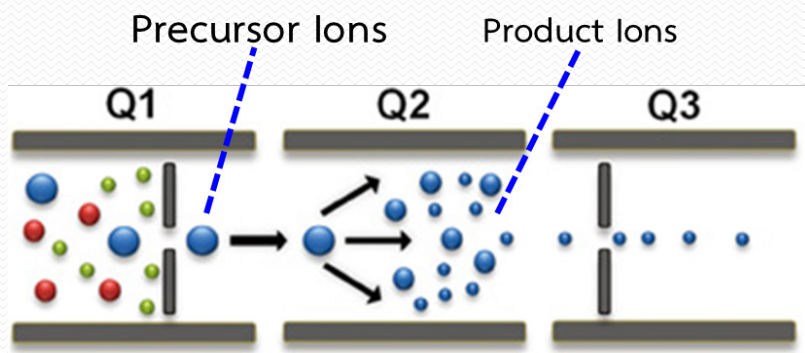
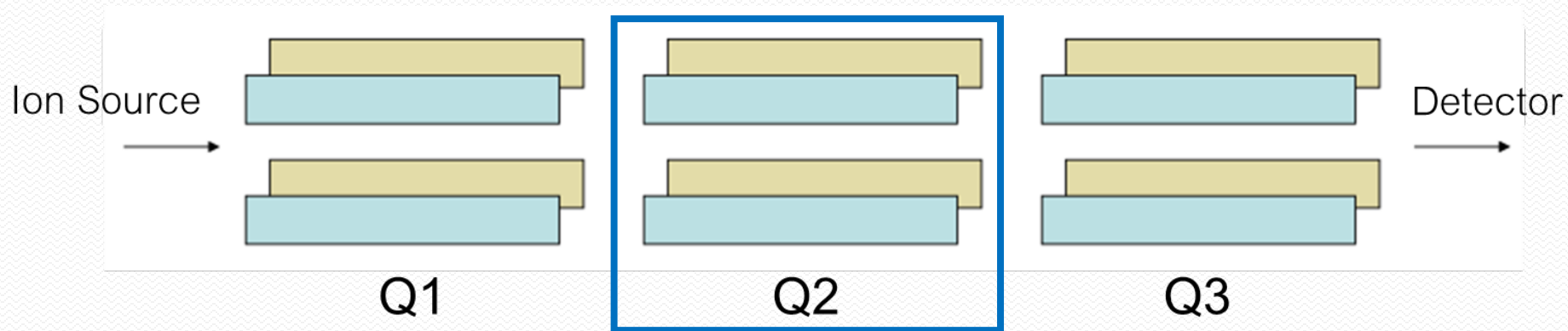
Mass Analyzer : Triple Quadrupoles (QqQ)



Mass filter

ions are scanned by varying the DC & RF voltages across the quadrupole set

Mass Analyzer : Triple Quadrupoles (QqQ)



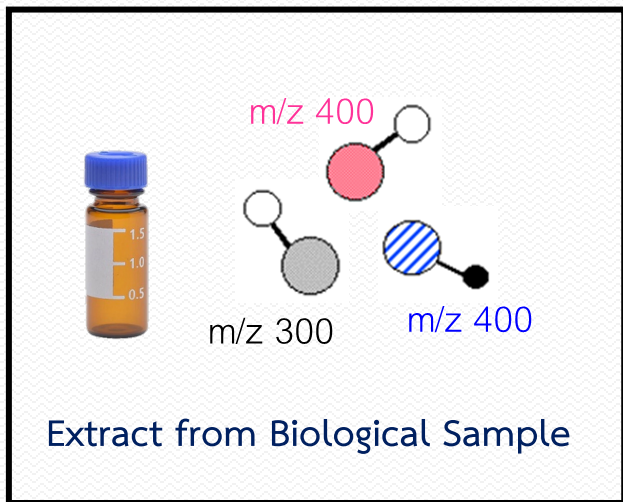
Fragmentation

(Collision gas: Ar/ N₂)

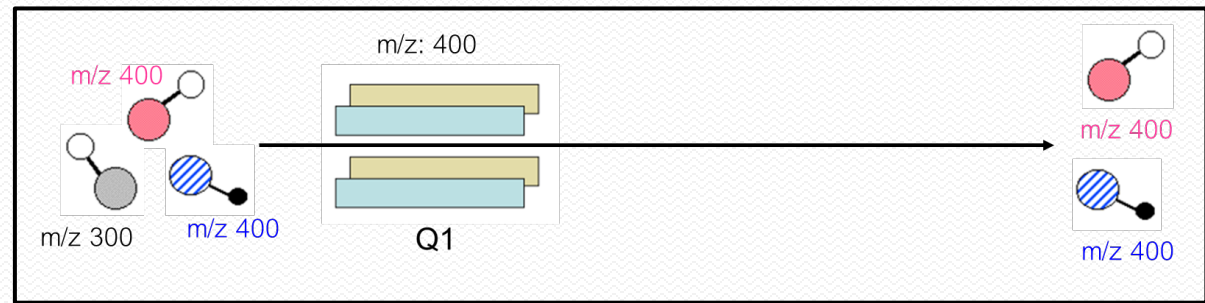
Collision Cell

where precursor ions are fragmented and pass through Q3 for ion sorting again

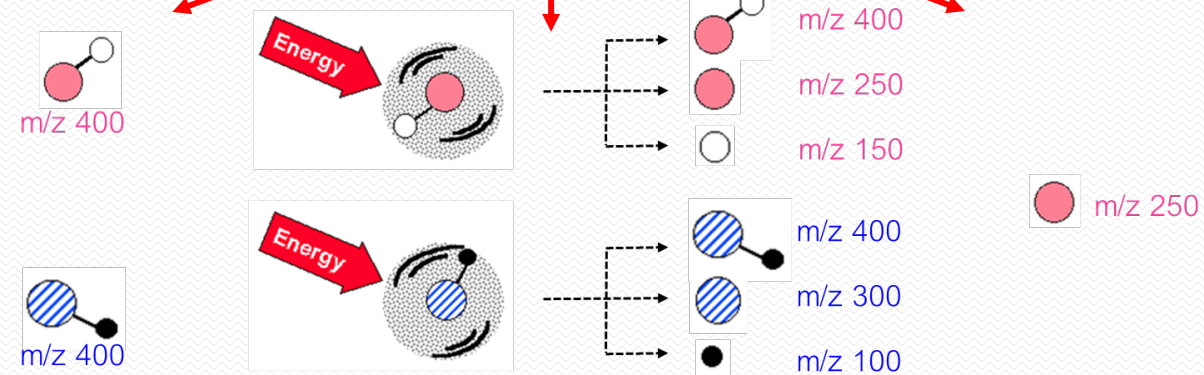
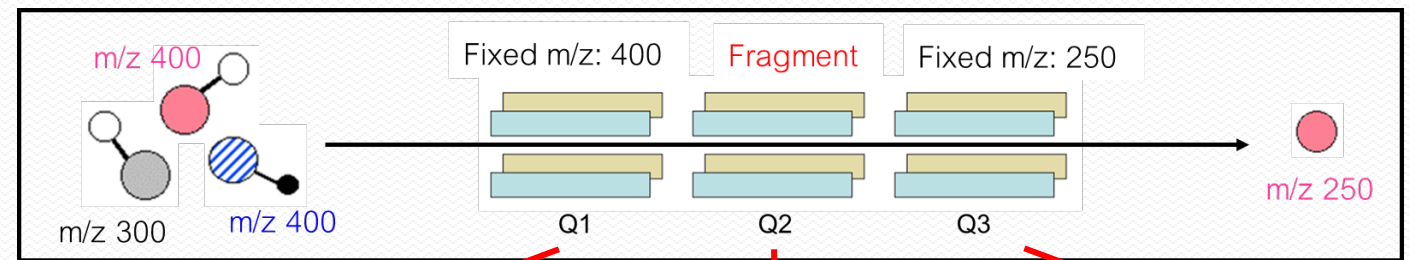
Triple Quadrupoles (QqQ)– Single Q VS Triple Q



Single Q



Triple Q



Q1: Precursor Ion

Q2: Fragmentation

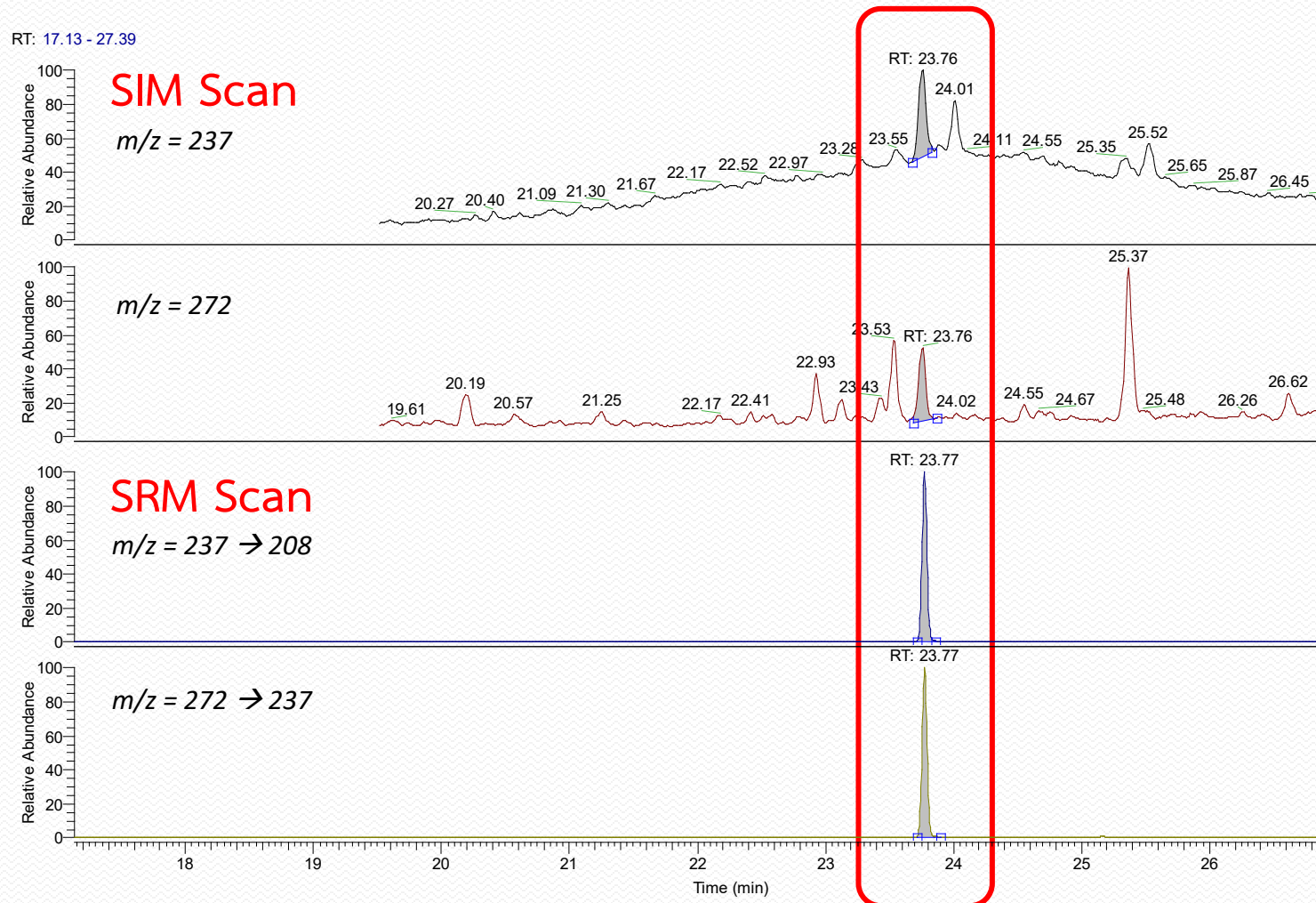
Q3: Product Ion

Mass Analyzer : Triple Quadrupoles (QqQ)

| Scan Mode | Q1 | Q2 | Q3 | Purpose |
|------------------------------------|-----------|----------------|-----------|-----------------------|
| Full Scan | Scanning | Pass All | Pass All | MW Info. |
| SIM (Selected Ion Monitoring) | Fixed m/z | Pass All | Pass All | Quantitation |
| SRM (Selected Reaction Monitoring) | Fixed m/z | Pass All (+CE) | Fixed m/z | Targeted Quantitation |
| Product | Fixed m/z | Pass All (+CE) | Scanning | Structural Info. |
| Neutral Loss | Scanning | Pass All (+CE) | Scanning | Analyte Screening |
| Precursor | Scanning | Pass All (+CE) | Fixed m/z | Analyte Screening |

Mass Analyzer : Triple Quadrupoles (QqQ)

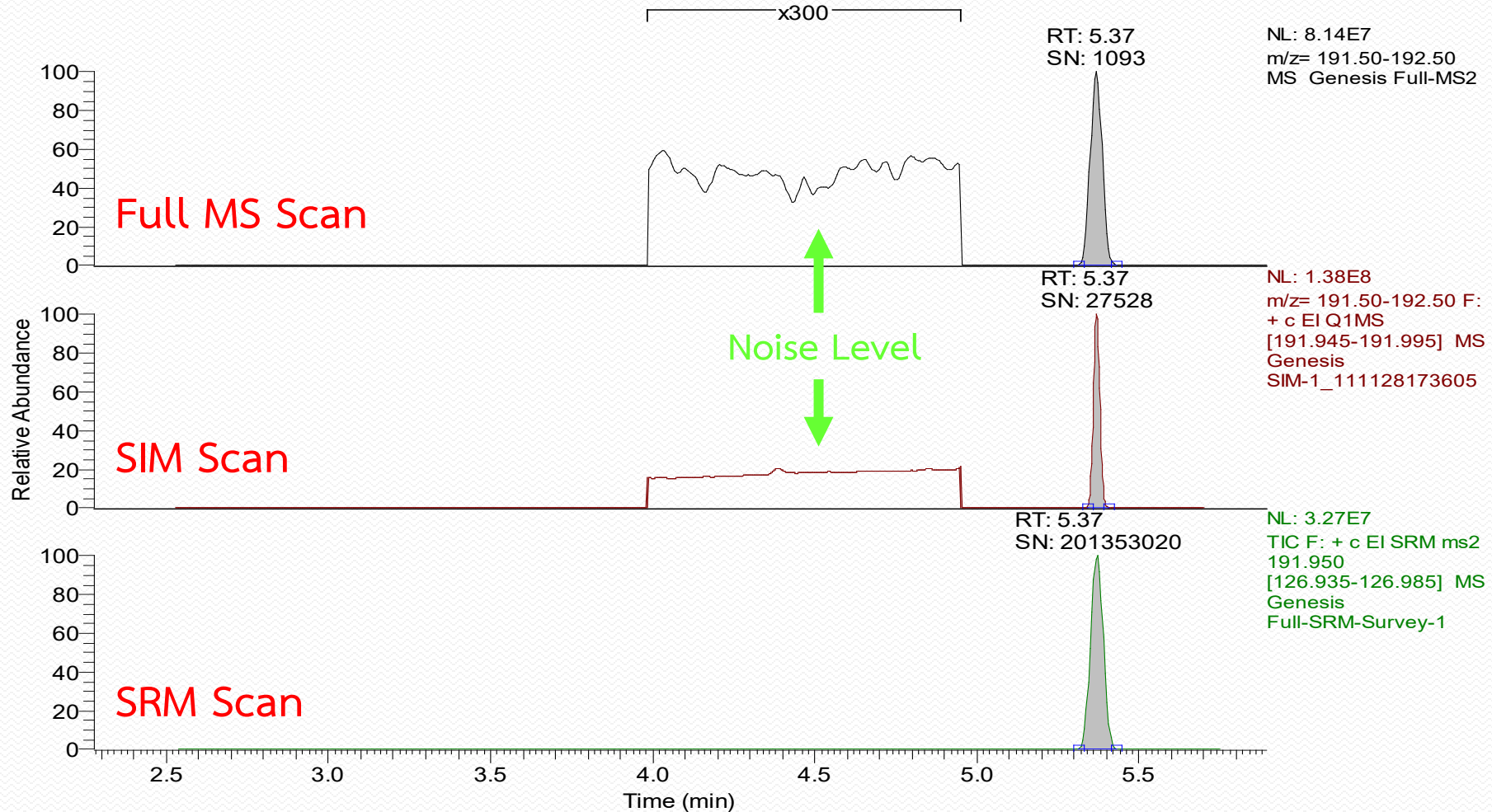
- Superior Selectivity - *free from sample matrix*



Mass Analyzer : Triple Quadrupoles (QqQ)

- Increase sensitivity

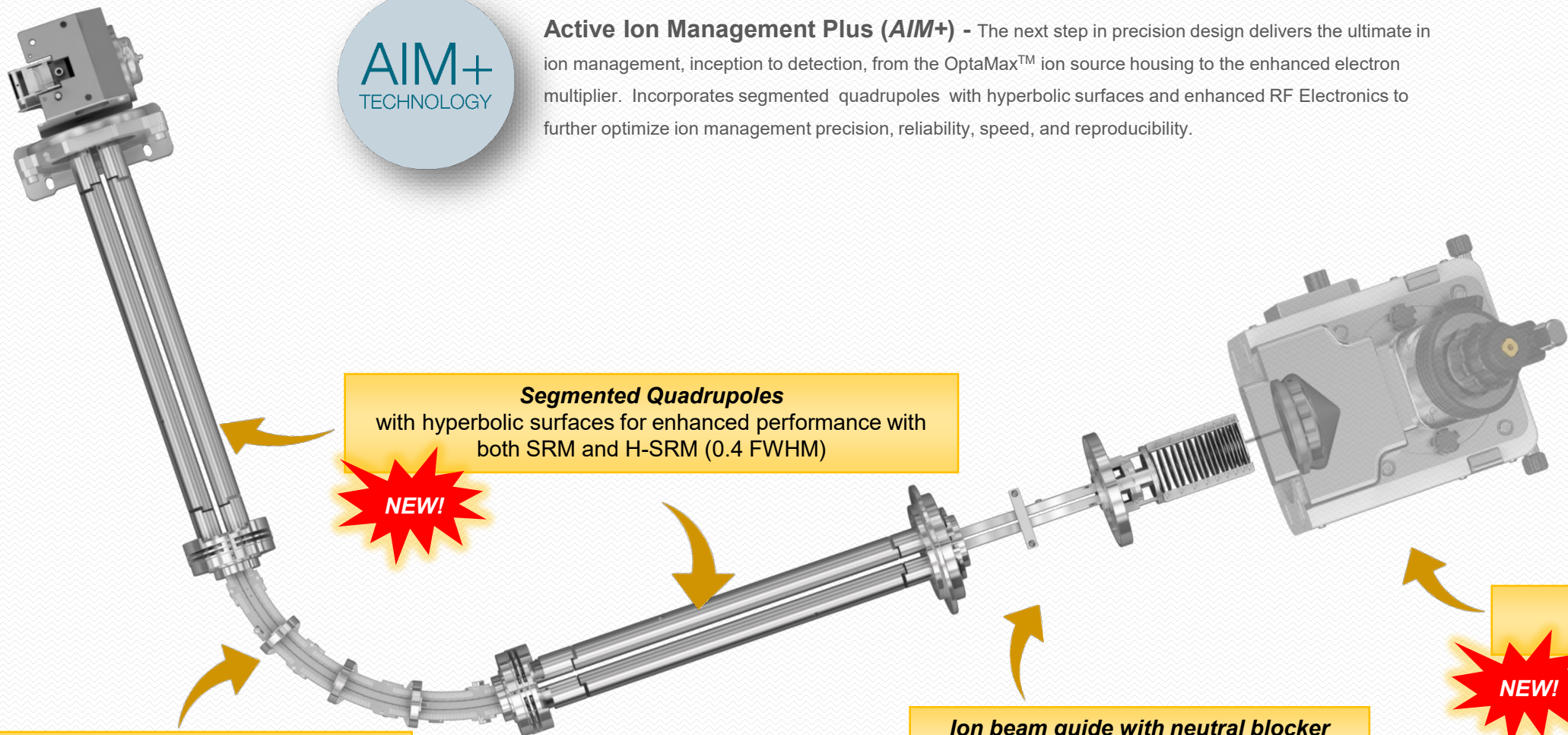
RT: 2.28 - 5.89 SM: 15G



TSQ Series: Confidence, Day After Day



Active Ion Management Plus (AIM+) - The next step in precision design delivers the ultimate in ion management, inception to detection, from the OptaMax™ ion source housing to the enhanced electron multiplier. Incorporates segmented quadrupoles with hyperbolic surfaces and enhanced RF Electronics to further optimize ion management precision, reliability, speed, and reproducibility.



Segmented Quadrupoles
with hyperbolic surfaces for enhanced performance with both SRM and H-SRM (0.4 FWHM)



OptaMax™ NG
APCI ready



Active collision cell with axial DC field
facilitates more SRMs/sec

Ion beam guide with neutral blocker
Reduces chemical background

TSQ Series: Applications

