

A Field Deployable Ion Trap Mass Spectrometer with Atmospheric Pressure Interface
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Talk Line-up


- Goals for MT Explorer 50 development
- MTE50 design features
- MTE50 specifications
- MTE50 configurations
- MTE50 potential market



2

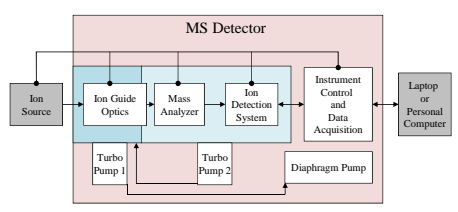
Goals for MT Explorer 50 Development

- Field-deployable instrument for:
 - ✓ small molecule analysis
 - ✓ biomolecule analysis
- Sensitivity comparable with that of commercial desktops
- Interfacing with all atmospheric pressure (AP) ionization techniques
- Providing software tools for custom application software development




3

MTE50 Design Features

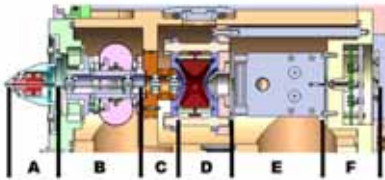


- Two vacuum chamber design (U.S. Patent 8,471,199)
- Bounded hydrogen (metal hydride) cartridge as a source for buffer gas (U.S. Patent 8,476,586)



4

MTE50 Design Features



- A. Cone, heating elements and inlet capillary
- B. Ion optics: inlet hexapole ion guide and conductance limit orifice
- C. Ion Optics: MS analyzer hexapole ion guide
- D. Ion trap mass analyzer
- E. Conversion dynode and electron multiplier
- F. Pre-amplifier

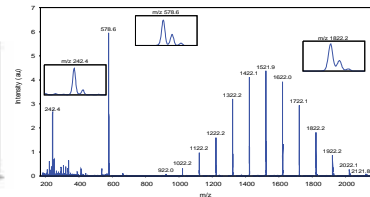


MTE50: Specifications

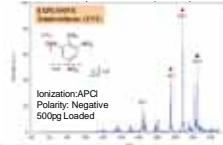


- Atmospheric pressure interface (API)
- MS and MS/MS modes of operation
- Mass range: 30-2,500 Da
- Mass accuracy 0.3 Da
- Weight 75 lb
- Dimensions 12"x17"x20"
- Power 100-300W

ESI-MS of the calibration mixture



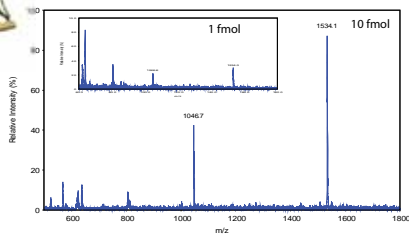
APCI-MS/MS of TNT



MTE50 Interfaced with AP-MALDI Ion Source



Limit of detection



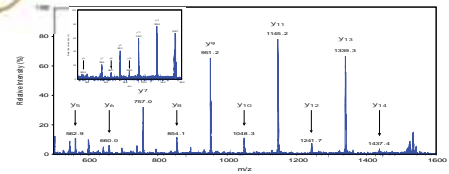
AP MALDI MS spectra of peptide mixture of Angiotensin II (MW 1046 Da) and P14R (MW 1534 Da): 10 fmol and 1 fmol (insert) loaded



MTE50 Interfaced with AP-MALDI Ion Source



MS/MS capability

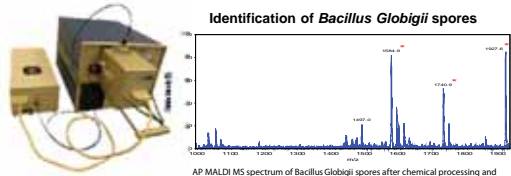


AP MALDI MS/MS spectra of P14R peptide ions: 10 fmol and 1 fmol (insert) loaded

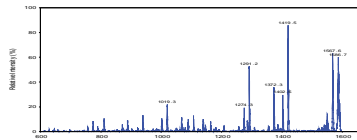


MTE50 Interfaced with AP-MALDI Ion Source

Identification of *Bacillus Globigii* spores



AP MALDI MS spectrum of *Bacillus Globigii* spores after chemical processing and digestion by trypsin (BG spores biomarker peptide are indicated)



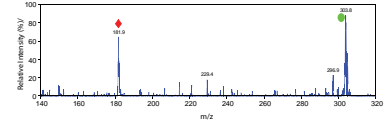
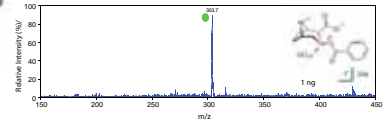
AP MALDI MS/MS spectrum of BG peptide ion with m/z value of 1584 in the spectrum above



9

MTE50 Interfaced with DART Ion Source

Detection of narcotics



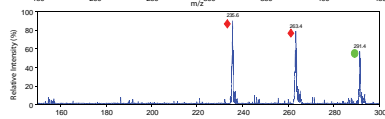
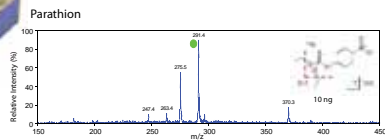
DART MS and DART MS/MS spectra of Cocaine. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



10

MTE50 Interfaced with DART Ion Source

Detection of pesticides



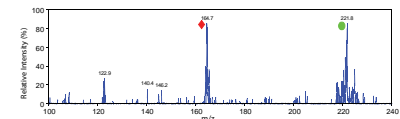
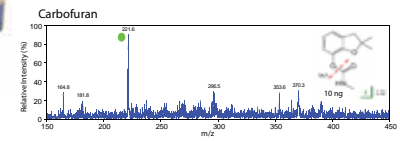
DART MS and DART MS/MS spectra of Parathion. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



11

MTE50 Interfaced with DART Ion Source

Detection of pesticides



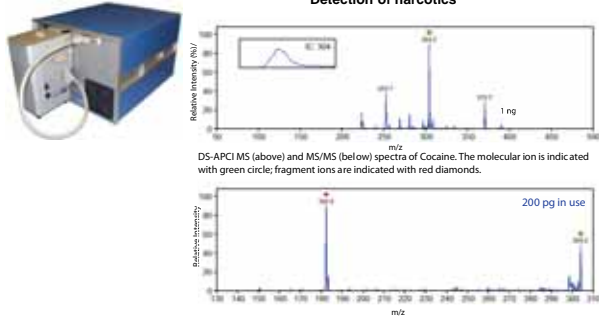
DART MS and DART MS/MS spectra of Carbofuran. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



12

MTE50 Interfaced with DS-APCI Ion Source

Detection of narcotics



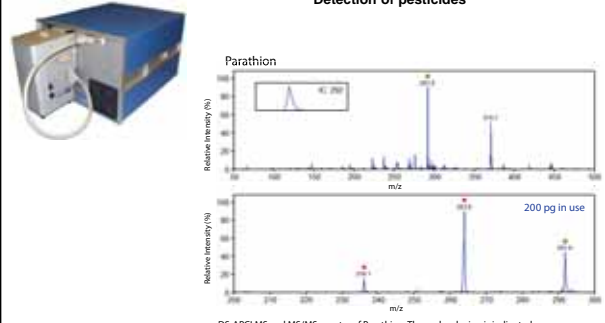
DS-APCI MS (above) and MS/MS (below) spectra of Cocaine. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



13

MTE50 Interfaced with DS-APCI Ion Source

Detection of pesticides



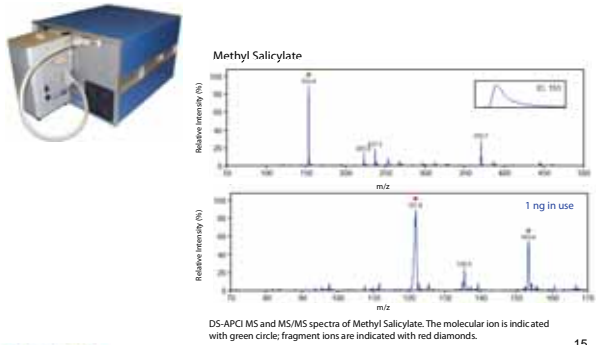
Parathion
DS-APCI MS (above) and MS/MS (below) spectra of Parathion. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



14

MTE50 Interfaced with DS-APCI Ion Source

Methyl Salicylate



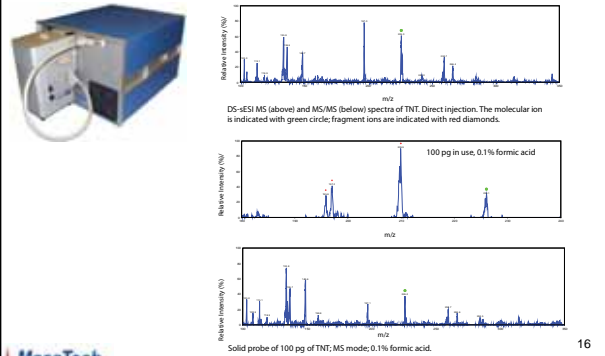
DS-APCI MS and MS/MS spectra of Methyl Salicylate. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.



15

MTE50 Interfaced with DS-sESI Ion Source

Detection of explosives



DS-sESI MS (above) and MS/MS (below) spectra of TNT. Direct injection. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds.

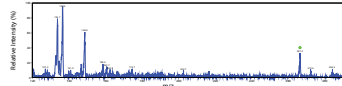


16

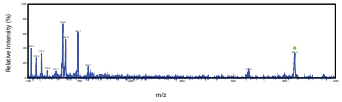
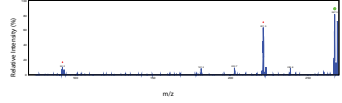
MTE50 Interfaced with DS-sESI Ion Source



Detection of explosives



DS-sESI MS (above) and MS/MS spectra (below) of 10 ng RDX by direct injection. The molecular ion is indicated with green circle; fragment ions are indicated with red diamonds. 0.1% formic acid.



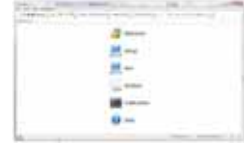
DS-sESI MS spectra of 10 ng PETN (above), 0.1% formic acid.

17

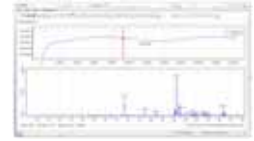
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MODAS: Control Software

Software tools for custom application software development



Normal and expert mode of operations



Built-in chromatogram viewer

18

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Portable MS: What is the potential market?



- Field-deployable mass spectrometry (MS) applications
- Portable MS applications
- Environmental MS applications
- Ambient MS applications
- Fieldable biological MS applications (like DoD, DHS, DARPA)

19

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