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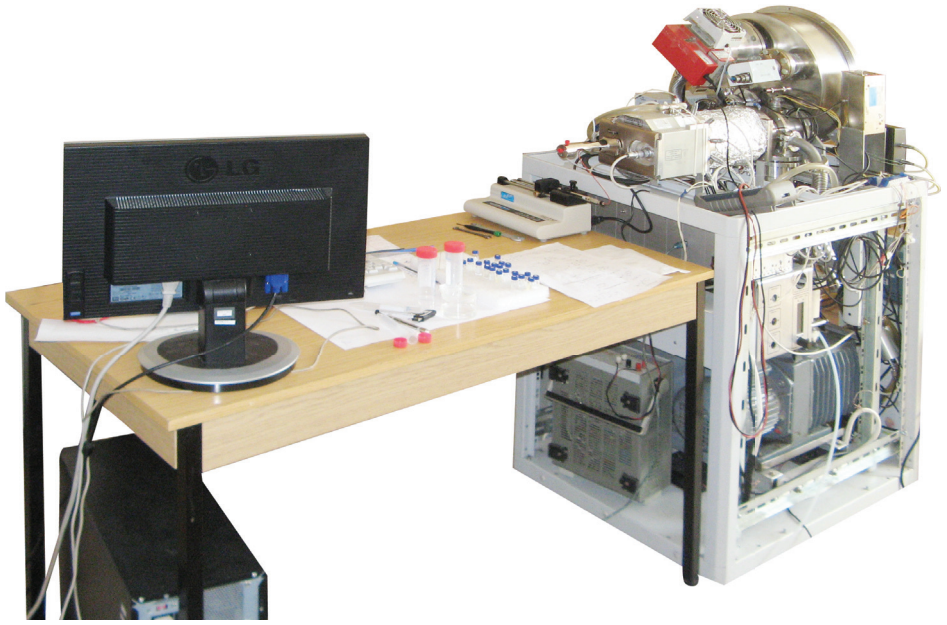
MaOS AxiSpec: Gases and Liquid Analyzer Based on Ion Mobility Mass Spectrometry

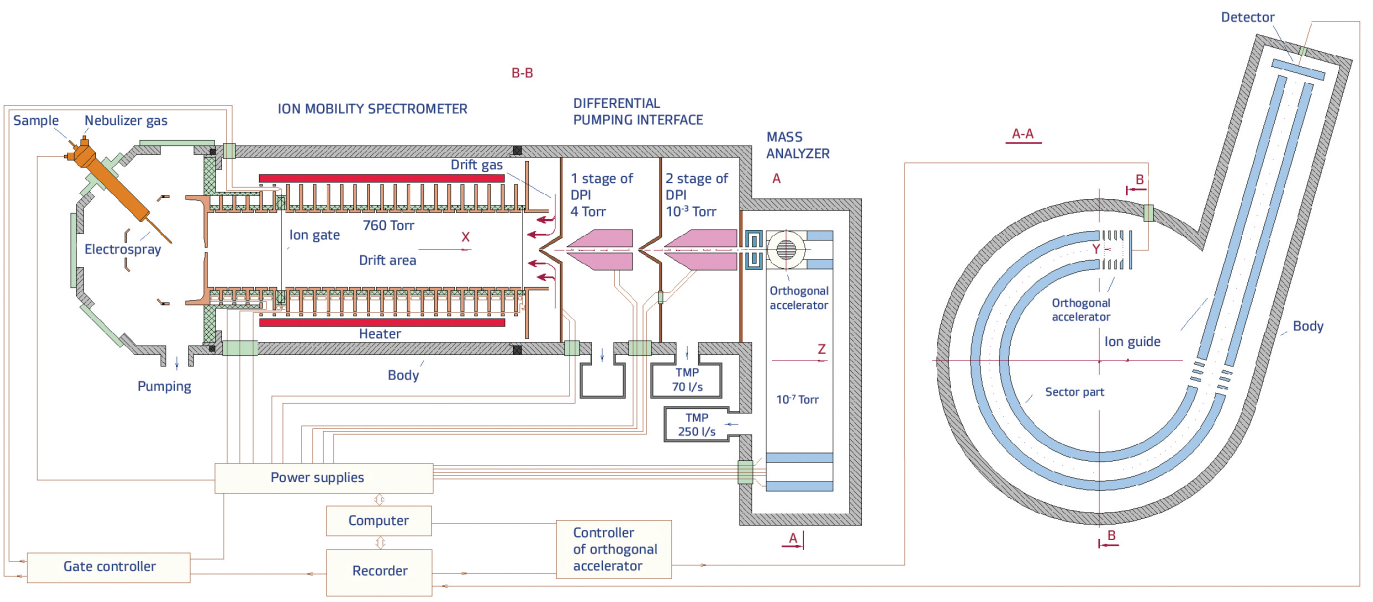


Application area:

- health care
- drug discovery
- pharmacy
- environmental monitoring
- forensic science
- homeland security

Technical performance:

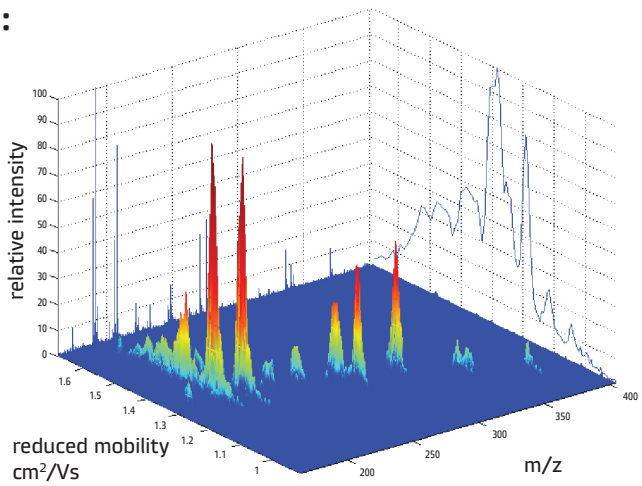
- The patented design of the device is a combination of a multifunctional sample introduction and ionization system, drift tube ion mobility spectrometer and sector TOF mass spectrometer with orthogonal acceleration.
- Multifunction sample introduction and ionization system works with both integrated ion sources and external available engineering solutions. Integrated ionization platform allows to use electrospray (ESI), atmosphere pressure chemical ionization (APCI), atmosphere pressure photoionization (APPI).
- The high-resolution ion mobility spectrometer provides maximum selectivity compared to existing commercial instruments.



Detection limits obtained for some illicit drugs:

Compound	Detection limit	
	relative, M	absolute, g
Methylone	$3*10^{-7}$	$7*10^{-10}$
4-MEC	$1.5*10^{-7}$	$4*10^{-10}$
3,4-MDPV	$4*10^{-8}$	$1.5*10^{-10}$
JWH-210	$4*10^{-7}$	$1.7*10^{-9}$
JWH-250	$2.3*10^{-7}$	$7*10^{-10}$
JWH-203	$3*10^{-7}$	$1.2*10^{-9}$
Cocaine	$4*10^{-9}$	$1.4*10^{-11}$

[A.A. Sysoev, S.S. Poteshin, D.M. Chernyshev, A.V. Karpov, Y.B. Tuzkov, V.V. Kyzmin, A.A. Sysoev, Analysis of new synthetic drugs by ion mobility time-of-flight mass spectrometry, European Journal of Mass Spectrometry, 2014, 20 (2), 185-192]

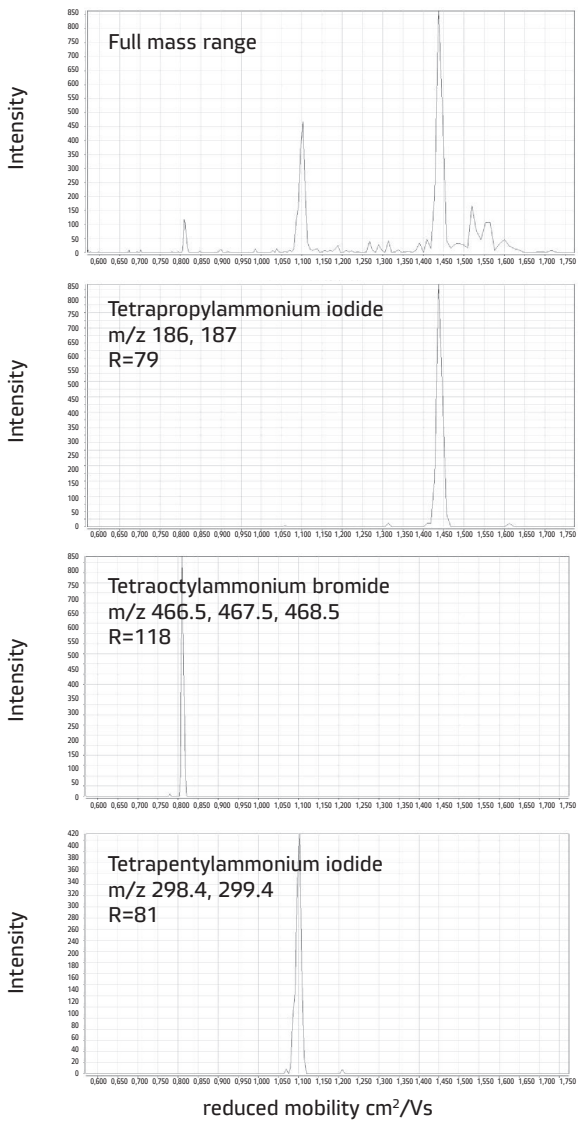


Main advantages over conventional approaches:

- The method allows to reach better sensivity than approaches based on orthogonal acceleration reflectron TOF analyzers.
- This method allows to analyze gases and liquids much faster than liquid chromatography / mass spectrometry.

Mobility resolving power	70 – 120 (measured as td/dt1/2)
Drift tube temperature	20 – 250ºC
Axial TOF mass analyzer	with sector field can allow better sampling efficiency comparing other energy focusing orthogonal acceleration TOF analyzers
Mass range	20 – 1000 Da (higher mass ranges can be measured if difference between time-of-flights for lowest and highest masses does not exceed 48 µsec)
Mass resolving power	2000 (FWHM)
Detection limits	relative $4*10^{-9}$ M, absolute $7*10^{-15}$ Mol (for 2,6-DtBP during 100 sec)
Mass accuracy	5 ppm
Data collection	real time integrating transient recorder based on 655 MHz 8 bit analog-to-digital converter
Weight	100 kg
Dimensions	60 cm (wide) x 80 cm (deep) x 130 cm (tall)
Software	control of instrumental parameters, data collection and processing

[A.A. Sysoev, D.M. Chernyshev, S.S. Poteshin, A.V. Karpov, O.I. Fomin, A.A. Sysoev, Development of an atmospheric pressure ion mobility spectrometer - mass spectrometer with an orthogonal acceleration electrostatic sector TOF mass analyzer, Analytical Chemistry, 2013, 85 (19), 9003–9012]



Mass-selective mobility distribution derived from IMS/MS data obtained for a mixture of tetrapropylammonium iodide, tetrapentylammonium iodide, and tetraoctylammonium bromide showing mobility resolving power R ranging in 70-120.

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