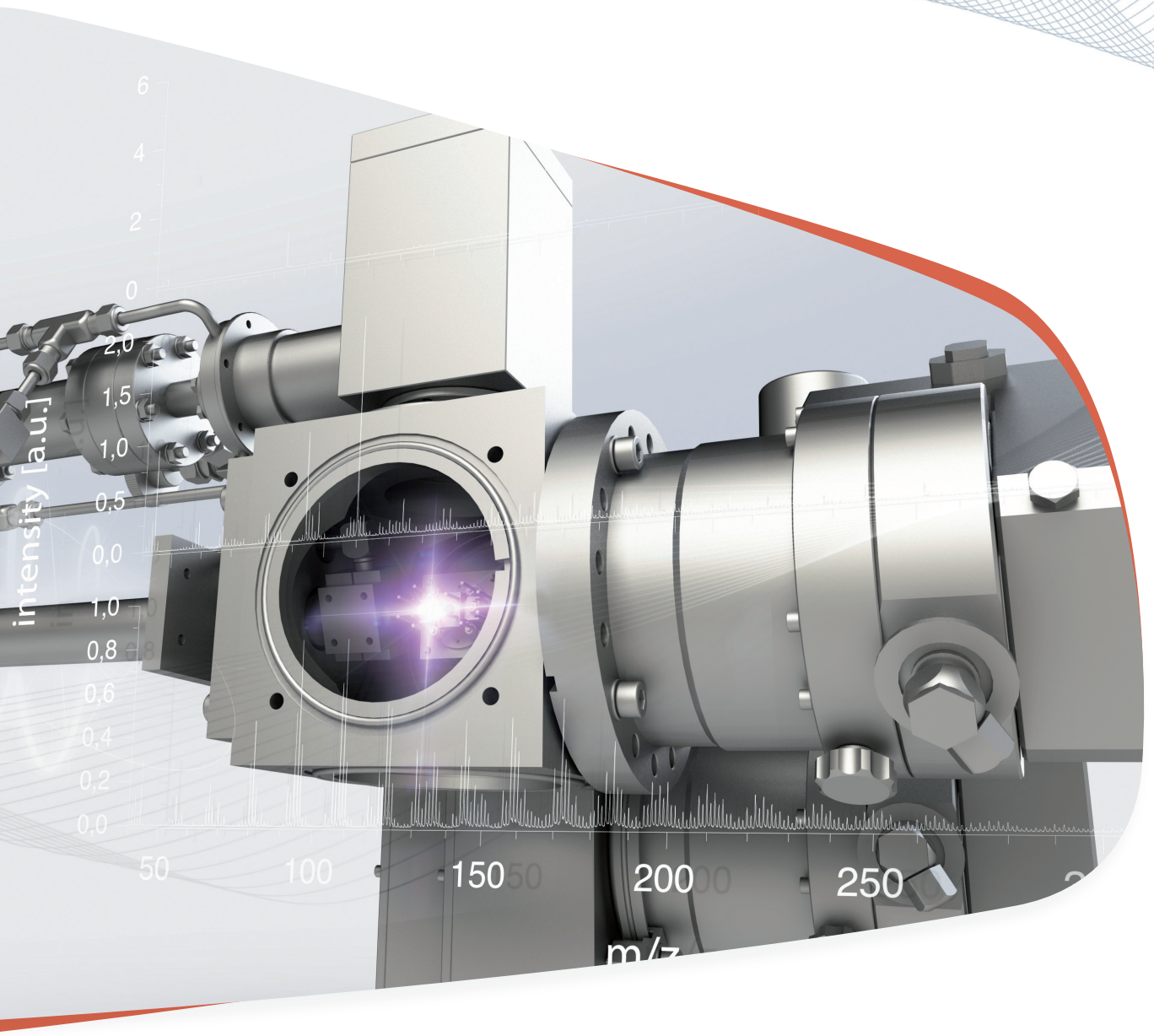
photonion



Product Description +

PHOTO-**TOF-MS**

CUSTOMIZED GAS ANALYZER

Fast on-site analysis of compounds by soft ionization (VUV) mass spectrometry

PHOTO-**TOF-MS**

CUSTOMIZED GAS ANALYZER

Our new on-line real-time measuring system

Photonion GmbH has developed a new on-line real-time measuring system for chemical gas analysis based on time of flight mass spectrometry (TOF-MS). Three different ionization techniques are applicable: (a) single photon ionization (SPI) with a special VUV excimer source or laser VUV source, (b) resonance enhanced multiphoton ionization (REMPI) with a laser beam or (c) electron impact ionization (EI). SPI and REMPI are considered as soft ionization techniques allowing the acquisition of mass spectra with nearly no fragmentation. A heated transfer line allows direct gas analysis (e.g. for process gas measurement such as coffee roasting [1], engine exhaust [2], combustion exhausts analysis or hyphenation to other instruments such as cigarette smoking machines [3], pyrolysis [4] thermal analysis (TA) [5] or gas chromatography (GC) etc.)

[1] *Hertz et al.; Journal of Mass Spectrometry 2013, 48, 1253-1265*
[2] *Adam et al.; Anal. Bioanal. Chem. 2012, 404 : 273-276*
[3] *Hertz et al.; Analytica Chimica Acta 2012, 714, 104-113*
[4] *Fendt et al.; Energy & Fuels; 2012, 26, 701-711*
[5] *Fendt et al.; Thermochimica Acta. 2013, 551, 155-163*

VUV [vacuum ultra violet]

Functional Description

Gaseous samples are addressed continuously by the Photo-TOF-MS mass spectrometry system at a flow rate of ~2mL/s. Depending on the ionization technique various relevant species can be ionized by SPI, REMPI or EI. After the ionization, the formed ions are accelerated into the reflectron time-of-flight mass analyzer where they are separated due to their different mass to charge ratios. A typical TOF mass spectrum can be generated in some milliseconds. Hence, this fast on-line measurement system is a selective and sensitive analytical method to investigate complex gas mixtures such as from combustion processes.

Technical Data and Specifications

VUV-photo ionization (SPI):

UNIVERSAL SOFT IONIZATION OF ORGANIC COMPOUNDS

VUV lamp (e.g. electron-beam pumped argon excimer light source) with 9.8eV (126nm) or Nd:YAG laser with third harmonic generation VUV-cell with 10.5eV (118nm)
▶ detection limits for most organics in ppb region

Laser-photo ionization (REMPI):

SUPERIOR SELECTIVITY AND SENSITIVITY FOR AROMATICS*

Fixed frequency (266 or 248nm) or tunable lasers (OPO) in wavelengths range 206nm-300nm
▶ detection limits for most aromatics in low ppb or ppt region *** (optional)**

Electron ionization (EI)

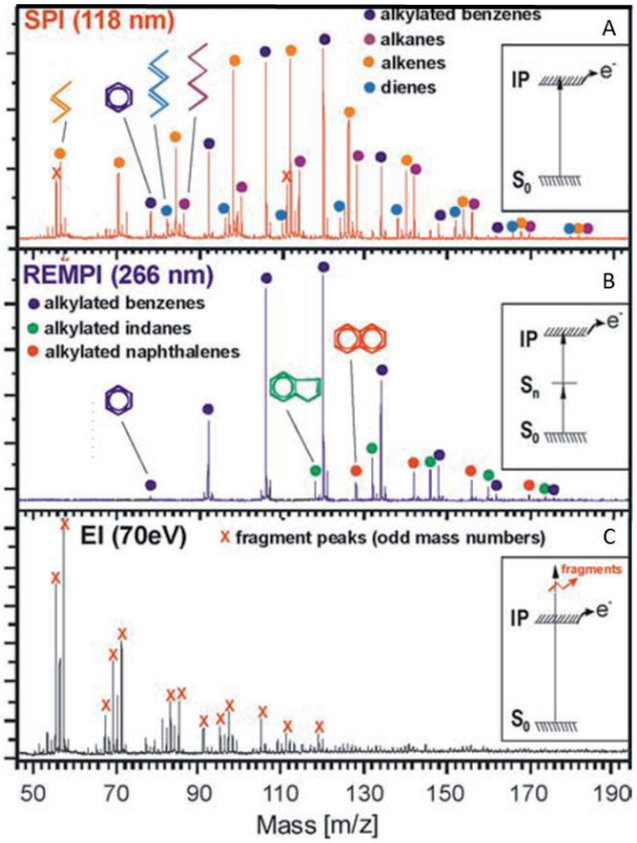
STANDARD FRAGMENTING IONIZATION TECHNIQUE *

70eV for mass spectra with standard fragmentation (NIST) or tunable from 5eV to 90eV (special setup)
▶ detection limits in ppm - ppb range *** (optional)**

Multiplexing ionization mode (MIM)

ACHIEVING SPI, REMPI AND EI RESULTS SIMULTANEOUSLY *

The ionization methods (REMPI/EI/SPI) can be operated quasi-simultaneously via multiplexed acquisition methods *** (optional)**



Direct inlet TOFMS of diesel fuel headspace, recorded with (A) single photon ionization (SPI), (B) resonance enhanced multiphoton ionization (REMPI) and (C) electron impact ionization (EI).

Features ▾

Special inlet system:

| unique flexible heated transfer-line and customized sample solutions
| on-line gas phase measurements hyphenation to thermal analysis,
| gas chromatography, pyrolysis, etc.

TOF-mass analyzer:

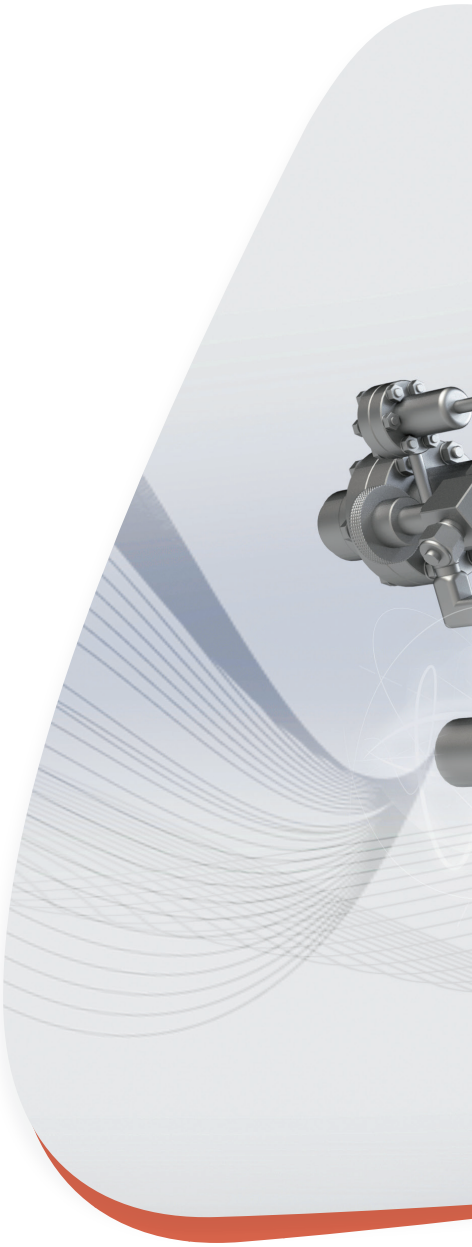
| Direct reflection time of flight mass spectrometer (flight path 0,9m)
| Mass range: 10 – 2000 Th (m/z) (standard configuration)
| Mass resolution: m/Δm = 2000
| Linear dynamic range: 104
| Mass accuracy: 100ppm
| Maximal primary data acquisition rate: 100kHz

Rack configuration (specification dependent):

| 2x19"-module rack, Dimensions (WxDxH): 1.2 x 0.8 x 1.3m
| Power supply 100-230V, 50/60Hz

Data acquisition and visualization software:

The data is displayed in real time. The actual measured mass spectra and the variation of selected ions is displayed. Data can be exported (formats e.g.: TXT, CSV).



Applications

Pyrolysis of wood
Coffee roasting
Pyrolysis of tobacco
Analysis of exhaust gases (engine, industrial combustion)
Breath analysis
Hyphenation to other instruments
(gas chromatography, thermal desorption, thermal analysis, smoking machine)

PHOTO-**TOF**-**MS**

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