

# COMPACT HIGH-RESOLUTION MASS SPECTROMETER FOR ACCURATE GAS ANALYSIS



- Highest resolution with the smallest footprint
- Readily optimize sensitivity and resolution for any case
- Can measure low-mass ranges that other products cannot
  - Mass range:  $m/z$  0.8-1,000
- Combine with GC or TGA to analyze complex samples
- Resolution: >30,000 (FWHM @ $m/z$  28)
- Ionization: EI

**INFITOF**  
Multi-turn Time-of-flight MS

## ENVIRONMENT

- Measuring green house gases simultaneously in real time
- Complex samples from air, soil, and water



## ENERGY

- Hydrogen and helium isotopic differentiation
- Chemical differentiation of petroleum and derivatives
- Characterize combustion efficiency and byproducts



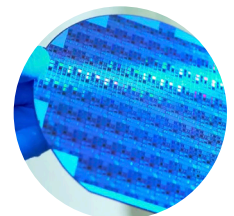
## PHARMACEUTICAL

- Hydrogen and helium isotopic differentiation
- Chemical differentiation of petroleum and derivatives
- Characterize combustion efficiency and byproducts



## HIGH PURITY PROCESS GASES

- Specialty gases for semiconductor and other industries

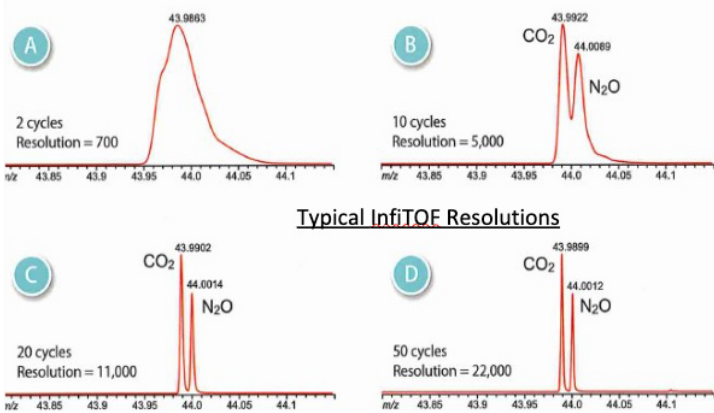


# ENVIRONMENT

- Measure all greenhouse gases with high resolution in real time ( $\text{CO}_2/\text{N}_2\text{O}$ ). Only one instrument is required to measure all greenhouse gases

## Example:

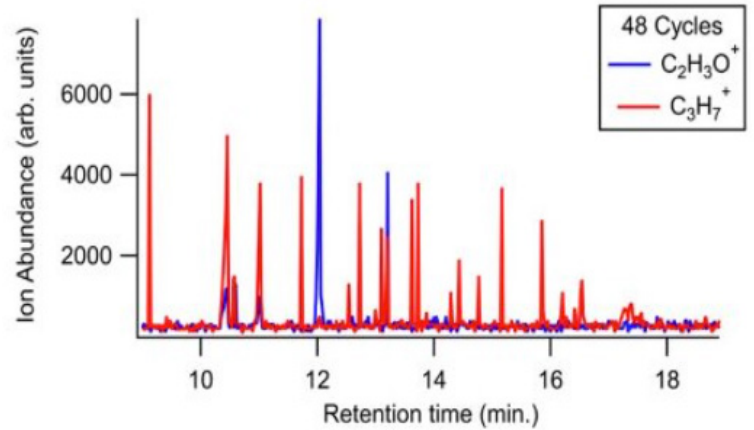
- Increasing the number of cycles through the infiTOF achieves resolution well beyond QMS or lower resolution TOF instruments



- Analysis of complex samples from air/soil/water

## Example:

- Aerosol sample, mixture of organic molecules present in atmospheric conditions ( $\text{C}_2\text{H}_3\text{O}^+$  and  $\text{C}_3\text{H}_7^+$  are Acetyl and Isopropyl fragments).
- Data shown is pre-separated via GC.
- Advantage over standard to high-end TOF systems (2k-8k). infiTOF has a maximum limit >30k

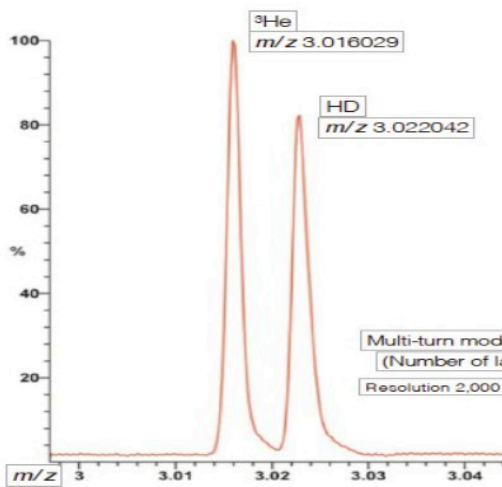


# ENERGY

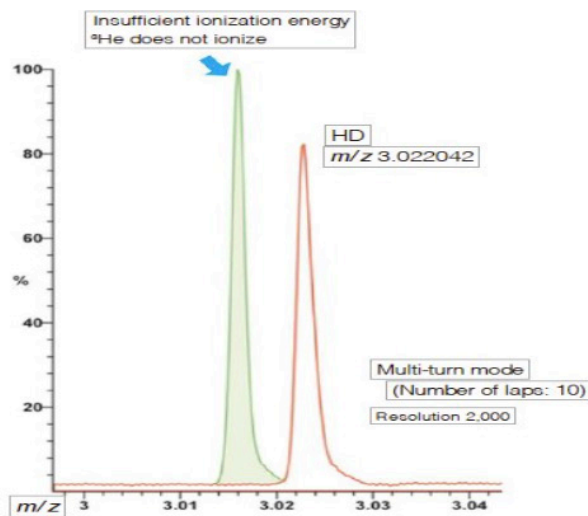
- Hydrogen and helium isotopic differentiation
- Chemical differentiation of petroleum and derivatives
- Characterize combustion efficiency and byproducts

## Example:

- Helium-3 ( $^3\text{He}$ ) is an isotope that exists in the atmosphere at only one millionth of helium-4 ( $^4\text{He}$ ), and is used in nuclear fusion research and neutron detection. Hydrogen deuteride (HD) is  $^1\text{H} + ^2\text{H}$ . The example below shows that HD can be distinctly separated from  $^3\text{He}$  by the infiTOF.



EI ionization voltage 70 eV



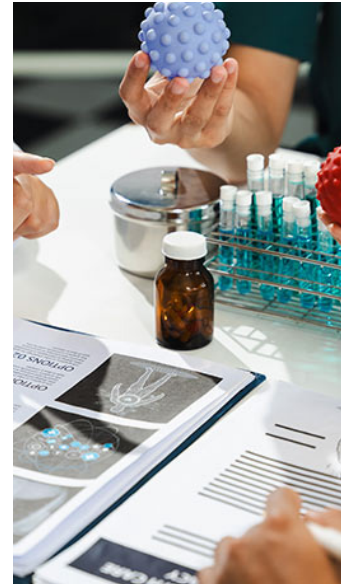
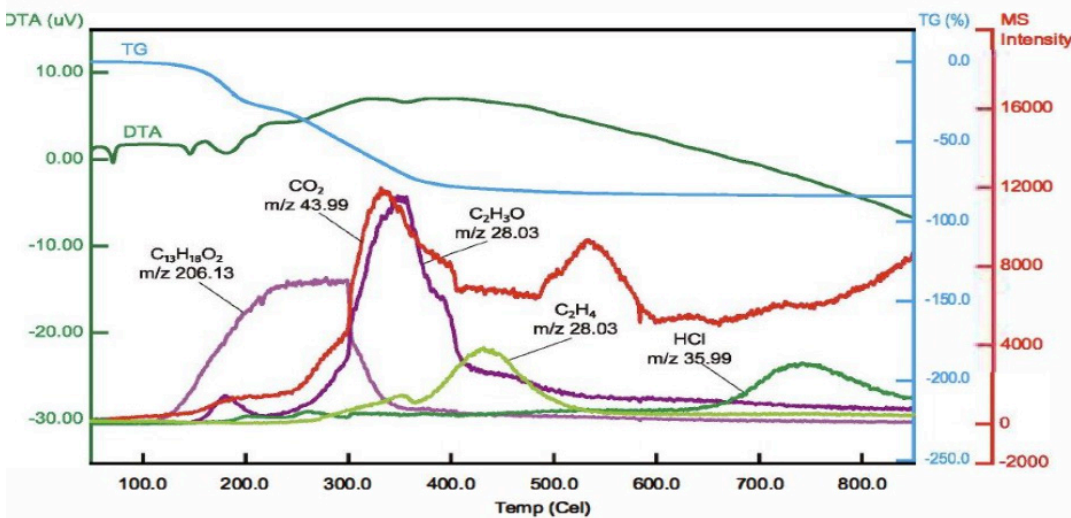
EI ionization voltage 20 eV

# PHARMACEUTICAL

- Measure active/inactive ingredients in complex formulations
- Identify and quantify cannabinoids of interest

## Example:

- TG/DTA analysis is used to confirm the thermal stability of the pharmaceuticals, and also as a qualitative analysis of the generated components. The illustration below shows how the infiTOF can be used to confirm the presence and quantity of Caffeine ( $C_8H_{10}N_4O_2$ ) identified by fragments at (55, 82, 108, and 194) and Ibuprofen ( $C_{13}H_{18}O_2$ ).

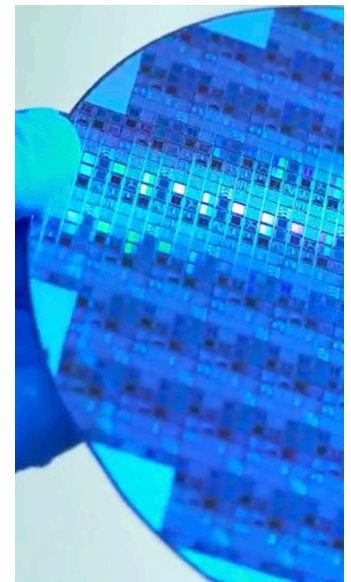
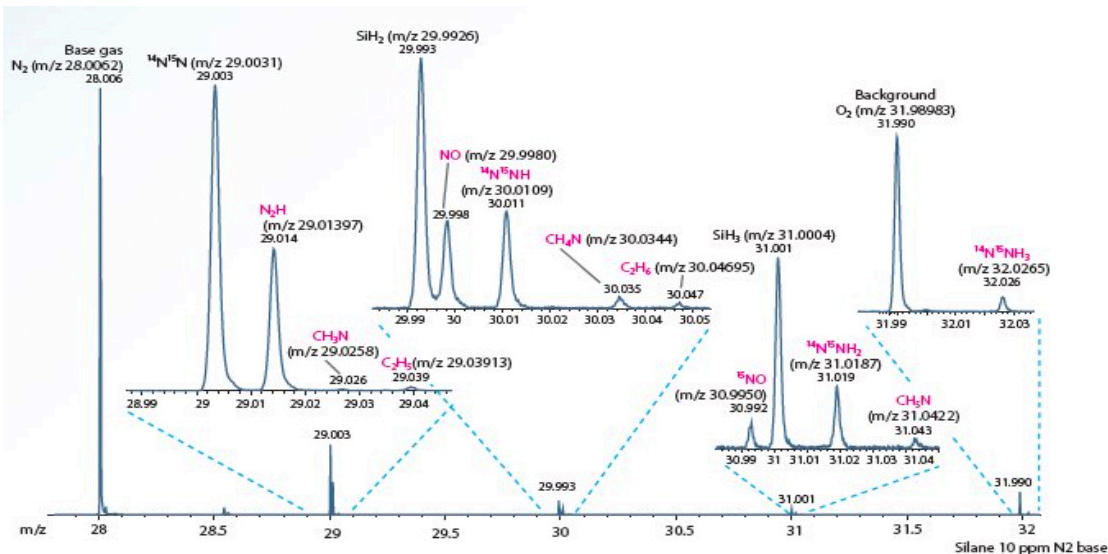


# HIGH PURITY PROCESS GASES (SEMICONDUCTOR, ETC.)

- Quality control for high purity gas providers used in semiconductor production.
- Real-time 24/7 monitoring system.
- Advantage over Cavity Ring Down (CRDS) systems, which require a unique laser/molecule. infiTOF has high resolution across a large mass range to detect any contamination that is present.

## Example:

- Silane ( $SiH_4$ ) is used for polycrystalline deposition or interconnects or masking growth of epitaxial silicon. The infiTOF detects silane as a combination of  $SiH_3 + SiH_2$ . With a lower resolution mass spectrometry, both  $SiH_3$  and  $SiH_2$  would not separate silane from the contaminants. Ideally, only  $N_2$  and  $SiH_2 + SiH_3$  should be present, but the higher resolution of the infiTOF reveals many other contaminants shown in pink.



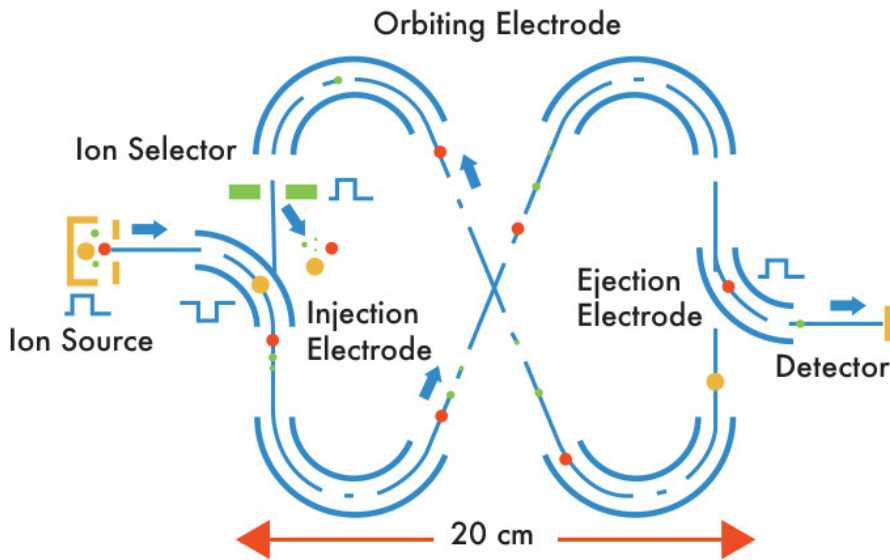


## APPLICATION

- Process gas monitoring for semiconductor or manufacturers
- Measurement of evolved gas from various materials by TPD-MS, TG-MS
- Analysis of trace components in air and high-purity gases
- Contamination analysis of hydrogen gas for fuel cells
- Combustion gas analysis
- Isotope analysis



infiTOF -DUO



## SPECIFICATIONS

Resolution	>30,000 (FWHM)
Mass Range	m/z 0.8-1,000
Ion-Source	EI (Pos)
Sensitivity	132 Xe (approx. 30ppb in air) S/N>10
Mass Accuracy	<0.002u (Internal Std) <0.005u (External Std)
Data Recording Speed	up to 50 spectra/sec
Dimensions (mm)	W270 x H460 x D550
Weight	39 kg

 **KANOMAX FMT**  
A Kanomax Company

KANOMAX FMT, Inc.  
4104 Hoffman Road  
White Bear Lake, MN 55110-3708 USA  
Phone: + 1-651-762-7762  
FAX: + 1-651-762-7763  
www.kanomaxfmt.com