

EPITORR™ Semiconductor Wafer Processing Analyzer



CIC Photonics, Inc. is dedicated to providing today's growing industries with the highest sensitivity and fastest time response instrumentation. Our analyzers are used worldwide in a variety of different arenas, and although CIC Photonics has a set of core systems, we pride ourselves on truly meeting the needs of our customers by adapting the core analyzers to their specifications.

Our EPITORR incorporates a rugged FTIR spectrometer with a stainless steel 6m 4Runner gas cell. This combination produces an analyzer that can handle some of the most demanding semiconductor wafer processing applications, while still providing high energy throughputs of 36-48 %. The EPITORR is ideal for applications requiring limits of detection in the 10 ppb level to ppm, in a transportable unit and with rapid gas exchange due to its low internal volume.

Included with the EPITORR is CIC Photonics patented SPGAS/SpectraStream analytical software package. This package does everything from concentration tracking and hardware managing to allowing the user to recalculate previously collected data within minutes.

General Parameters

Measurement Technique:	Fourier Transform Infrared Spectroscopy
Gases Measurable:	Most molecules expect for monoatomic (Ne, He, Ar) and diatomic homopolar (N ₂ , H ₂ , O ₂)
Range:	10ppb to ppm levels
Number of Components:	Unlimited
Response Time:	Gas cell and flowrate dependent
Operating Temperature:	10-35°C
Dimensions:	26in. (L) x 24in. (W) x 35in.(H) w/out castors
Weight:	170 lbs w/out castors
Power:	120/240 VAC, 50/60 Hz 600 Watts
Computer requirements:	Touchscreen PC with Microsoft Windows 2000/XP/Vista included

Limits of Detection

Species	Formula	6m 4Runner LOD (ppm)
Carbon Dioxide	CO ₂	0.27
Carbon Monoxide	CO	7.4
Diborane	B ₂ H ₆	0.33
Dichlorosilane	SiH ₂ Cl ₂	1.2
Hydrogen Chloride	HCl	0.095
Hydrogen Fluoride	HF	0.003
Silane	SiH ₄	0.5
Water	H ₂ O	0.007

The LODs listed on the left are for a WorkIR spectrometer w/ a TE-cooled InAs detector. The number of scans is 16 and for every 1 scan that equals 2 seconds. Level of confidence is sigma 1. They are calculated for 25°C and 1 atm.

Applications

- Measures moisture in batch load lock, transfer chamber and process chamber
- In-Situ leak detection after preventive maintenance in systems that have seen process gases
- Process gas concentrations- monitor effects of cylinder changes
 - Degradation of reactor O-rings by the detection of HF
 - Monitoring the life of gas purifiers

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Gas Cell

Pathlength:	6 meter 4Runner
Construction:	316L Stainless Steel (Ni-Plated)
Mirrors:	304 Stainless Steel, Gold Coated (proprietary)
Windows:	IR-Quartz (others available)
O-Rings:	Chemraz (for zero moisture)
Fittings:	1/4" VCR (others available)
Temperature:	0-220°C
Pressure:	Atmospheric to 150psi
Flow:	0.05-5 slpm (w/out pressure transducer)
Permeation box:	Yes (to eliminate moisture)
N2 Purifier:	Yes (for purging system)
Purge Box:	Motorized mirrors (automatic background collection)

Spectrometer

Model:	ABB Bomem WorkIR-AZ
Spectra Resolution:	2cm ⁻¹ (1-128 cm ⁻¹ available)
Scan Time:	Automated scanning 23s
Infrared Source:	SiC
Reference Laser:	HeNe solid state 633nm
Detector:	TE-Cooled InAs
Spectrometer & Optics Purge Flow:	5 SLPM
Purge Connection:	1/4" VCR at 30 psig
Beamsplitter:	KBr
Housing:	Transportable Cabinet with mounted Analyzer (castors optional)

“We sell Solutions, not Boxes”

Feature	EPITORR	Laser Spectroscopy	Quadrapole RGA	Electro-chemical Cell	Helium Leak Detector	Dew Point
Measures ppb moisture In Inert	Yes	Yes	Yes	Yes	No	Yes
Measures ppb moisture in other species	Yes	Yes	Yes	No	No	No
Measures Toxic Gas Concentration	Multiple	Single	Yes	No	No	No
Measures Corrosive Gas Concentration	Multiple	Single	No	No	No	No
Measures Flammable Gas Concentration	Multiple	Single	No	No	No	No
Overlapping species detectable	Yes	No	Yes	No	No	No
Vacuum Sampling Capability	Yes	No	High Vacuum	No	Yes	No
Sensitivity to Carrier Gas	No	No	Yes	Yes	NA	Yes
Requires Zeroing Test Chamber	No	No	No	Yes	No	No
Leak Detection Capability	Yes	No	Yes	No	Yes	No
Setup Response Time	< 1hour	< 1hour	>10 hours	<1 hour	< 1 hour	> 1 hour
Sampling Response Time	< 1 min	< 1 min	< 10 seconds	< 1 min	NA	> 1 min
Data archiving for reprocessing	Yes	Yes	No	No	No	No
Portability	Yes	No	No	Yes	Yes	No
Ease of Use (Turnkey)	Yes	Yes	No	Yes	Yes	No
Reliability	Yes	Yes	No	Yes	Yes	No
Safety	S2/S8, CE Mark, UL Listed	S2/S8, CE Mark, UL Listed	S2/S8, CE Mark, UL Listed	S2/S8, CE Mark, UL Listed	S2/S8, CE Mark, UL Listed	S2/S8, CE Mark, UL Listed
Training Included (2 persons)	Yes	No	No	No	No	No
Cost of Ownership	Medium	Medium	High	Low	Medium	Low
Qualified Application	In-Situ & High Pressure	High Pressure Only	High Vacuum Moisture	Gas Lines only	Startup only	Inert Source Gases