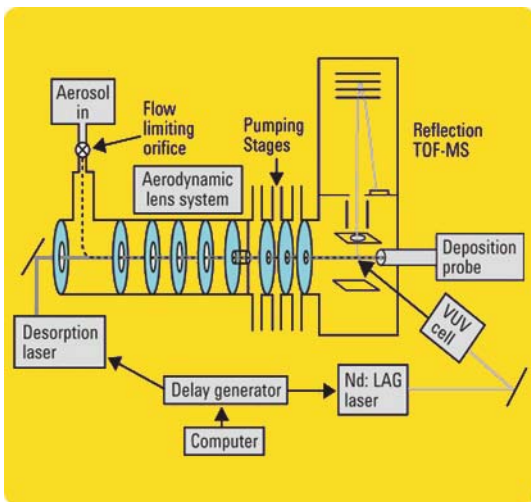




Application Overview

Photoionization Aerosol Mass Spectrometry (PIAMS) is a new method used for real-time organic component analysis in airborne particles below 300 nm in diameter to help understand atmospheric chemical processes such as secondary aerosol formation and subsequent reactivity. Measuring these small material amounts involves sampling for 12-24 hours, which makes it difficult to follow changes in the aerosol's physicochemical properties.

Applications include: This class of Time-of-Flight Mass Spectroscopy involves a high-speed digitizer used to measure the ion current of an incoming aerosol's particle beam through the spectrometer.

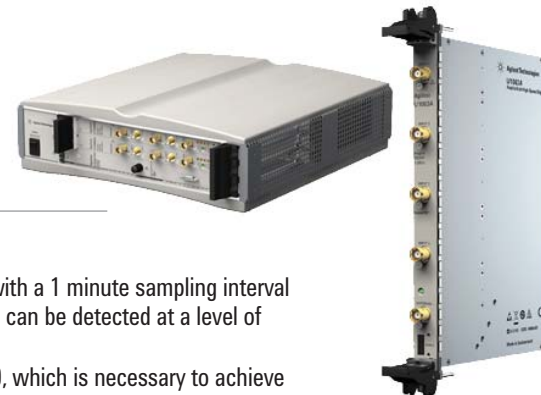


PIAMS for On-Line Compound Analysis in Airborne Particles

High Frequency Digitizer Technology used in Detecting Organic Air Pollutants

Solution Description

- Complete data acquisition system (U1056B) include digitizer, U1091AC30 cPCI crate and U1091AK02 PCI interface.
- U1063A, 8-bit, quad channel, 150 MHz, 500 MS/s sampling rate, 128 kpoints per channel, cPCI digitizer.



Key Features and Added Value

- The current version of PIAMS provides detection limits in the 5-50- pg range with a 1 minute sampling interval and an inlet flow rate of 0.1 l/min. Individual organic compounds in an aerosol can be detected at a level of 50-500 ng/m³, which is sufficient for smog chamber studies.
- The technology also allows a path to increase the sensitivity by a factor of 100, which is necessary to achieve organic compound detection at ambient levels and help identify major sources of air pollution.
- Two channels with 8-bit resolution simultaneously record aerosol data from the spectrometer, with different sensitivities and then recombine those into one spectrum by software to increase the dynamic range of detection.
- This type of recombination technique gives quality results only when channel to channel cross talk is very low and channels show identical, high-speed dynamic behavior.

Key Requirements

- Identification and analysis of individual organic components in ambient aerosol typically requires long sampling times and laborious sample cleanup and analysis.
- High quality Agilent-Acqiris digitizer technology offers the excellent dynamic range necessary to shorten sampling times and provide accurate measurements.

Resources

- U1056B, high-speed data converter systems brochure: <http://cp.literature.agilent.com/litweb/pdf/5989-7112EN.pdf>
- U1063A, 8-bit, cPCI digitizer brochure: <http://cp.literature.agilent.com/litweb/pdf/5989-7470EN.pdf>
- Article "Environment Photoionization Aerosol Mass Spectrometer": <http://cp.literature.agilent.com/litweb/pdf/5989-7560EN.pdf>
- Article "High-Speed Analog Signal Averager Improves Mass Accuracy, Dynamic Range in oaTOFMS": <http://cp.literature.agilent.com/litweb/pdf/5989-7554EN.pdf>
- Data Converter product selection guide: <http://cp.literature.agilent.com/litweb/pdf/5989-8038EN.pdf>
- Digitizers website: www.agilent.com/find/embedded-digitizers

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