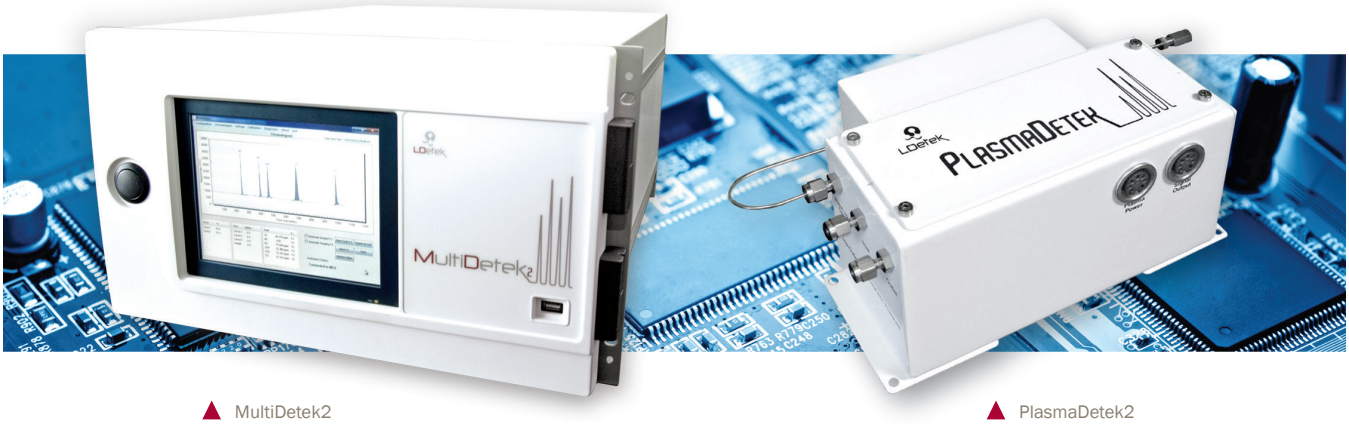
APPLICATION NOTE
LD20-03

MultiDetek2 gas chromatograph with PlasmaDetek2 detector uses for the analysis of semiconductor specialty gases as UHP Octafluorocyclobutane (C4F8)



▲ MultiDetek2 ▲ PlasmaDetek2

Octafluorocyclobutane, or perfluorocyclobutane, C4F8, is a compound of carbon and fluorine used in the production and processing of semiconductor materials and devices, for example as a deposition gas and etchant. Production of such high purity specialty gas then requires a quality control analyser.

LDETEK SOLUTION:

Measuring the production quality of complex electronic specialty gases as C4F8 uses as etchant can be realized with our gas chromatograph MultiDetek2.

Our system uses PlasmaDetek2 (PED) as detection device to ensure good selectivity and sensitivity down to sub ppb level.

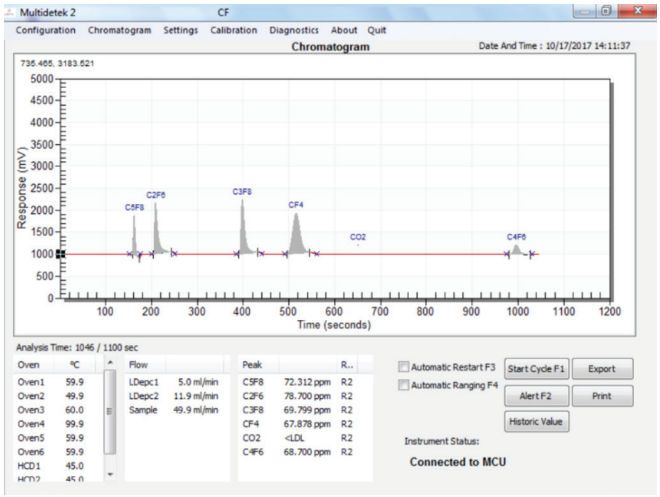
Multiple purged diaphragm valves ensure the leak integrity to keep the purity of the system in place for ppb detection. The column selection is adapted to CF gases to keep the reactivity and adsorption as low as possible to ensure the stability of the results. The complete flow path of the unit is coated with inert material to climinate the reactivity for such complex electronic gas mixtures.

Sample composition of (C4F8):

IMPURITIES	RANGE	SYSTEM LDL	SYSTEM LOQ
C_5F_8	0-100 ppm	25 ppb	75 ppb
C_2F_6	0-100 ppm	25 ppb	75 ppb
C_3F_8	0-100 ppm	25 ppb	75 ppb
CF_4	0-100 ppm	25 ppb	75 ppb
CO_2	0-100 ppm	25 ppb	75 ppb
C_4F_6	0-100 ppm	25 ppb	75 ppb
C_4F_8	100 %	---	---

RESULTS

Chromatogram of trace ppm impurities C5F8, C2F6, C3F8, CF4, CO2 and C4F6 in Octafluorocyclobutane (C4F8) sample gas



COMPONENT	CONCENTRATION	PEAK HEIGHT	NOISE	LDL (3X NOISE)
C_5F_8	72.312 ppm	891 mV	0.11 mV	26.7 ppb
C_2F_6	78.700 ppm	1289 mV	0.15 mV	27.4 ppb
C_3F_8	69.799 ppm	1371 mV	0.15 mV	22.9 ppb
CF_4	67.878 ppm	960 mV	0.11 mV	23.3 ppb
C_4F_6	68.700 ppm	249 mV	0.04 mV	33.1 ppb

Note: other LDL could be obtained with different injection volume and chromatographic condition

CONCLUSION:

The MultiDetek2 gas chromatograph uses with the PlasmaDetek2 detector offers the requirements for such type of specialty gas application. The configuration with purged diaphragm valves combined with coated inert gas flow path and columns makes the system perfectly adapted for such specialty and complex gases. The system is rackmount and compact offering a full remote control. The industrial communication protocols are all built in and must simply be selected specifically for your requirements.

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