

# Preconfigured High-Resolution CCD Spectrometer

**SM445**



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## SM445

### Preconfigured High-Resolution Compact CCD Spectrometer

Wide Spectral Range (Up to 200-1050nm)

High Optical Resolution by 3K array CCD

Extremely Low Light Exposure Time up to 10usec

Compact & Modular Design



#### The Choice for high speed data acquisition Applications

The SM445 is a new compact design CCD Spectrometer for use with a PC. Based on SP's special optical bench design, it supports many different applications where spectral or color measurements are required, including high dynamic range applications. The SM445 can accept light directly through its built-in slit or via optical fiber. The durable aluminum housing that encloses the SM445 provides stable optical bench operation over a wide range of temperatures. The standard sensor arrays used are the Toshiba TCD1304 for the SM445. The array driver electronics have been designed for highly sensitive yet stable operation.

This array (in conjunction with our special UV coating process and customized order sorting filters) allows up to an 850nm measurement window from 200nm to 1050nm (smaller measurement window sizes increase spectral resolution and light sensitivity). Thanks to the more pixel numbers, the SM445 is preferable for the applications requiring higher resolution.

Standard interface to the SM445 is a USB 1.1/2.0 compatible interface with 16-bit extended dynamic range. Our USB board can support multichannel configuration up to 8. With this multichannel configuration, a higher resolution for wide range or a dual spectrometer system (one for measurement and the other for reference) is possible.

Spectral Products applies new UV enhancing coating on the CCD to increase the UV sensitivity below 450nm comparing with the conventional UV coating that is widely used in CCD spectrometers. By the help of this new UV coating, the signal sensitivity below 500nm can get improved ~20-50% more in general. Software support includes an SDK and DLLs for dedicated applications development and our SM32Pro Windows-based spectral acquisition and analysis software.

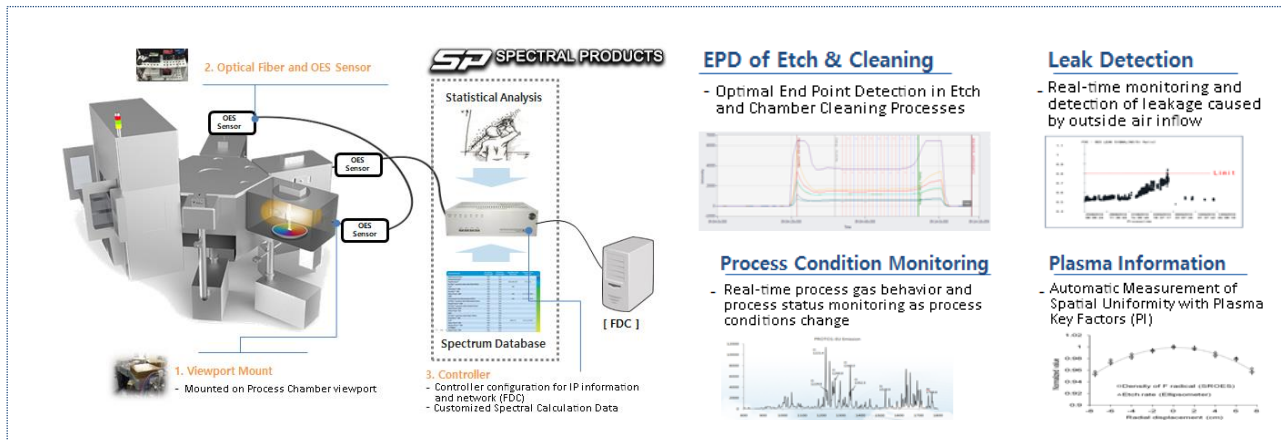
## Specifications :

Physical Dimension	
Dimensions (mm)	3.54 x 2.76 x 1.73 inches (90 x 70 x 44mm)
Weight (kg)	0.88lbs (0.4kg)
Fiber Optic Connector	SMA905 N.A.=0.22 Optical Fiber Input
Detector	
Detector	Toshiba TDC 1304 (UV Enhanced Coated)
Cooling	None
Windows Material	Quartz or Glass
Spectral Response Range	200-1050nm
Pixels	3648 (Effective)
Pixel Size	8 um X 200 um
Well Depth	100,000 e-
Optical Specification	
Wavelength Range	Full Range : 200-1050nm
	UV Range : 200-450nm
	VIS Range : 380-760nm
	NIR Range : 550-1050nm
	other user customized range
Optical Resolution	0.10-10nm ,dependent on spectral range, slit width, fiber diameter
Dark Noise RMS	< 50 RMS counts in 16bit @ 35msec integration time
Signal to Noise Ratio	> 300 : 1
Stray Light	<0.1% AVG.
Filter	Second Order Blocking Filter Installed
Electrical Specification	
ADC resolution	16bit (0-65535)
Minimum Integration Time	8msec (General Mode) / 10usec (Shutter Mode)
Interface	USB 1.1/2.0 Compatible
Trigger Mode	Freen Run Mode Software Trigger Mode External Trigger Mode
Computer	
Operating System	Windows XP/VISTA/Win7(32/64bit)/Win10(32/64bit)
Software	SM32Pro software included
Software Development Kit	Visual C++ DLL /LabVIEW VI SDK

# Applications

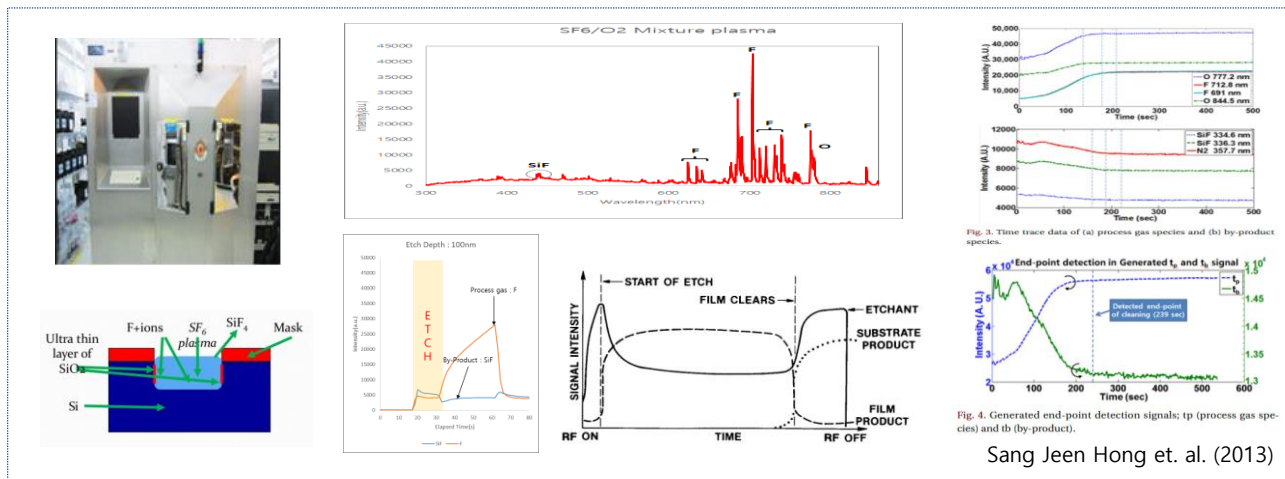
## Multichannel Optical Monitoring and Diagnostics of Plasma

- Real time optical monitoring and diagnostics of plasma process in semiconductor fabrications
- Multichannel based OES (optical emission spectroscopy) sensors in plasma process diagnostics



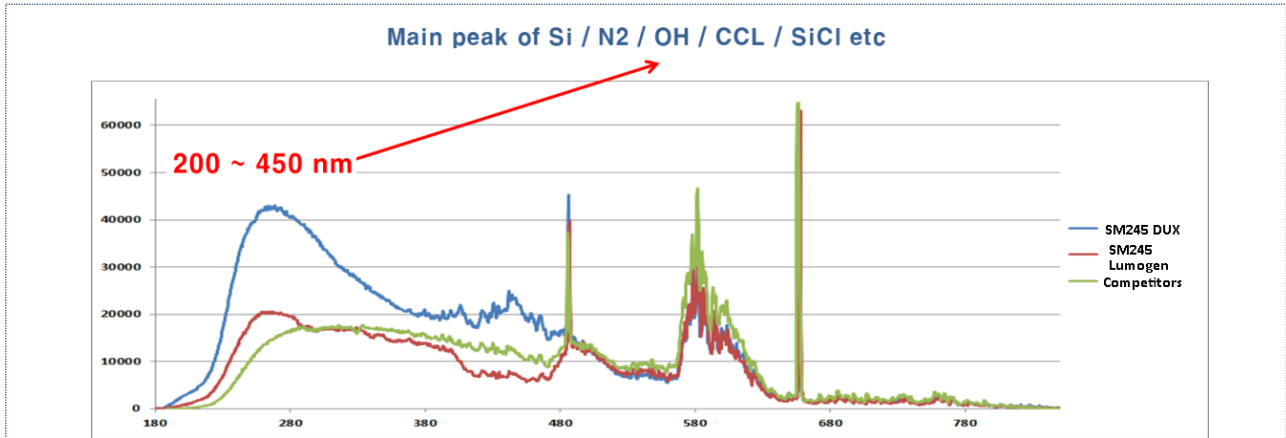
## EPD of Etch & Chamber Cleaning

- End Point Detection of plasma etch and cleaning process in semiconductor fabrications
- Saving production cost and time loss by optimization of EPD with statistical algorithms



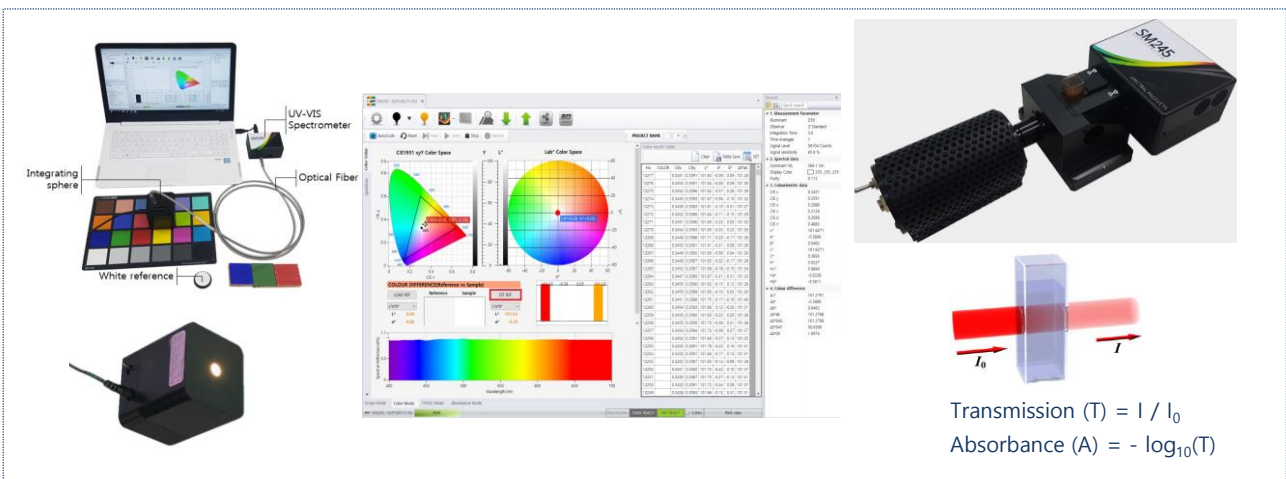
## High Deep UV Enhanced Coated CCD

- Responsivity to high deep UV (200-450 nm) is 2-3 times higher than general UV enhanced spectrometers
- Signal to noise ratio (SNR) more accurate when UV spectrum measurement results are acquired

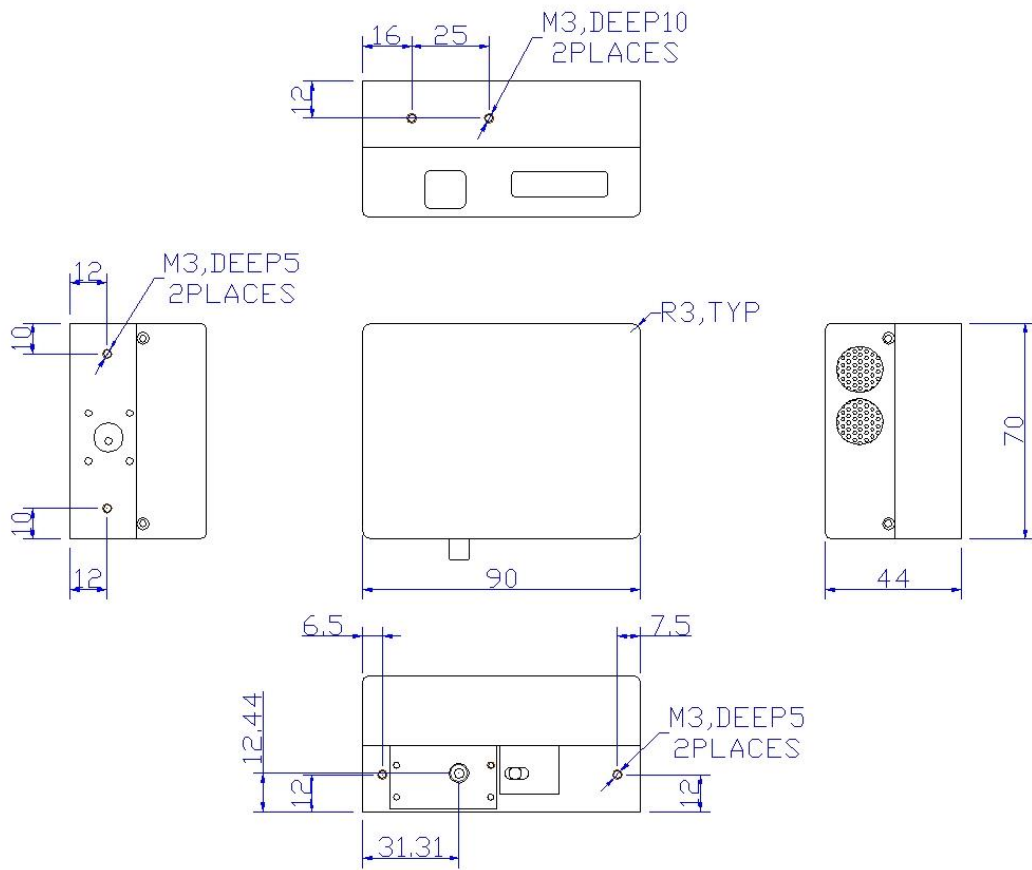


## Compact Color and Absorbance Measurement System (COLMAN)

- Reflectance and transmittance mode can provide color measurement using photometric and radiometric values
- Compact spectrophotometer for real time analysis of chemical and optical properties of samples



## Case Dimension :



(Size in mm)

**Ordering Information :** Please indicate product number plus description when ordering SM445 Preconfigured High-Resolution Compact CCD Spectrometer