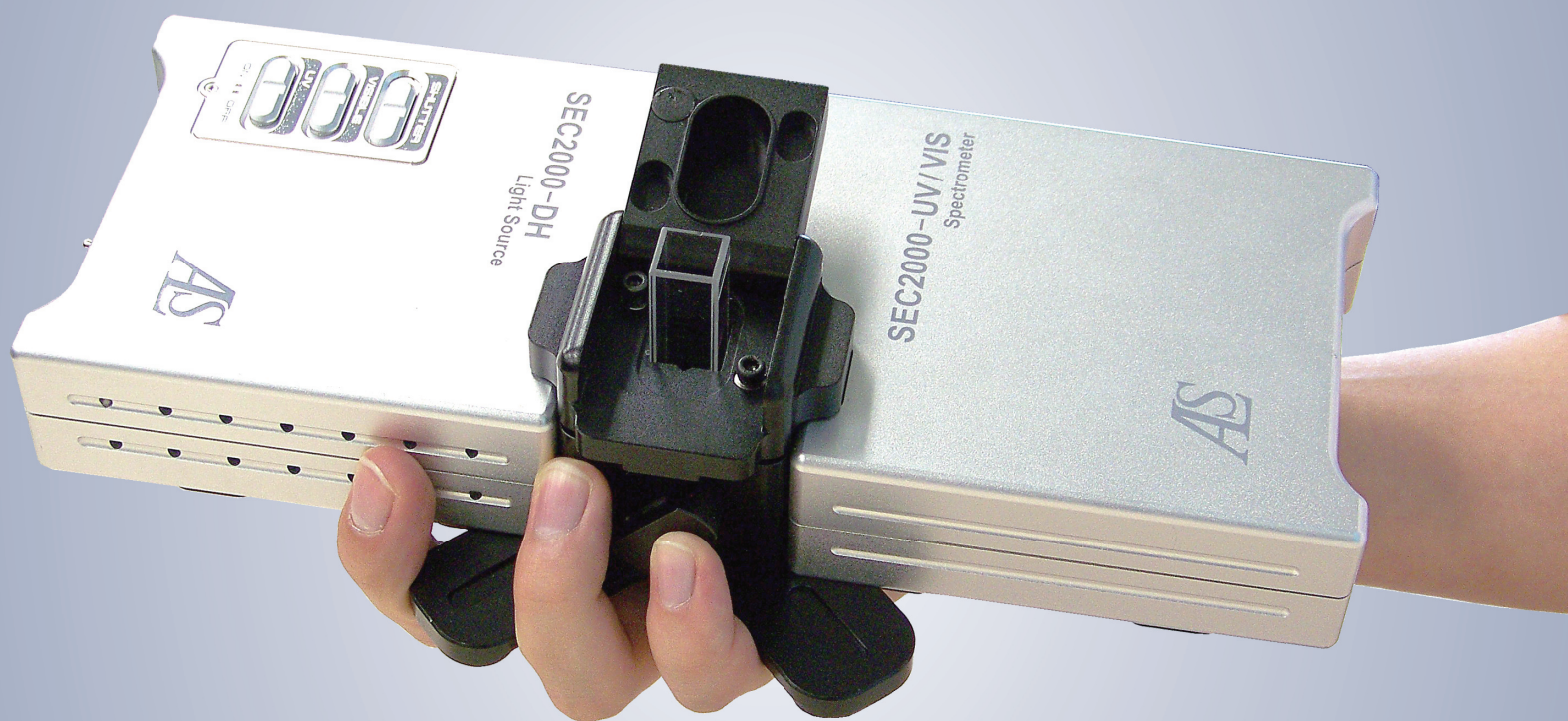


# SEC2000 Spectra system

UV/VIS | VIS/NIR

Simple and Easy Operation

Compact Spectrometer



Spectrometer/Cell Holder/Light source combo

Correspond to 3 Mode Measurement



« Absorbance mode »



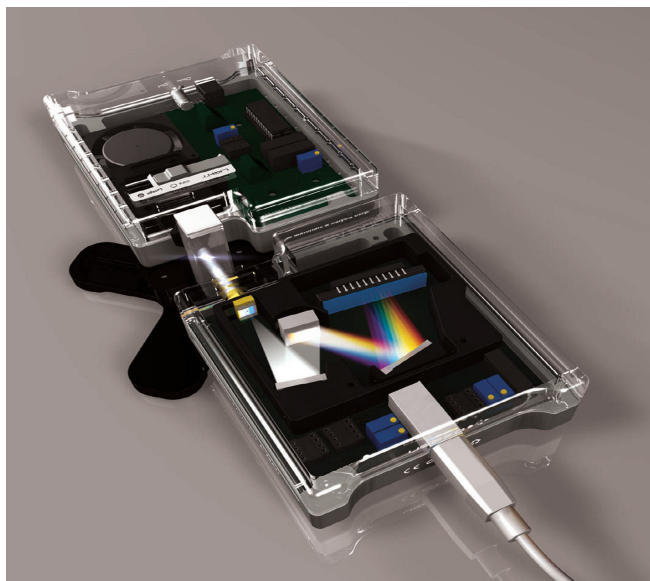
« Reflectance mode »



« Irradiance mode »

AS

# SEC2000 Spectra system for Analytical Chemistry



**SEC2000-UV/Vis Spectrometer** is a multi-channel spectrometer, specially designed for spectroelectrochemical measurement. You could have UV/VIS model and UV/NIR model, depending on the combination of spectrometer (detector) and light source.

Since the light source is composed of a small module lamp incorporated with lens, the fiber optics does not need extra light source such as optical fiber. The detector and light source could be set to the cell holder in a 90 degrees angle, then measurement of reflectance is also possible.



SEC2000 Spectra system specific box case is included as a basic component.

## Three layout for three measurement modes



### « Absorbance/Transmittance mode »

For spectroelectrochemical measurement



### « Reflectance mode »

For the measurement of the reflectance, set the sample (plate material) at 45 degrees into the cell holder cuvette (SEC2000-CUV)

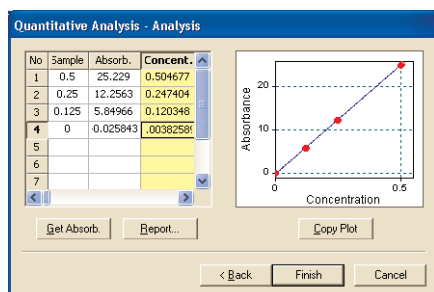


### « Irradiance mode »

For the measurement of the irradiance, connect to the FOIS-1 or CC-3.

## Software Visual Spectra

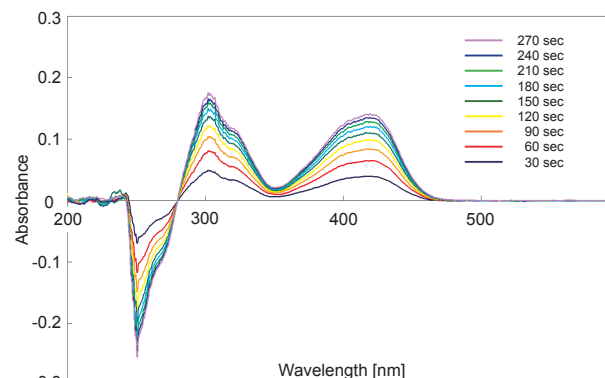
### « Calibration mode »



Visual Spectra is the software for SEC2000, which contains the calibration mode. Using the calibration mode, you could have the concentration analysis for two ways. The concentration of the sample could be obtained by baseline method or by the absorbance value at a single wavelength.

If your measurement analysis has an absorbance spectrum with noise, you could get the concentration using the baseline method, in this case the noise will not influence the result. For non-distinct and unclear absorption peak, you could determine the absorbance at the single wavelength.

### « Real time Monitoring »



Absorbance Changes for Oxidation Phase of Potassium Ferrocyanide Solution

The oxidation of Potassium Ferrocyanide at 800 mV vs Ag/AgCl was measured by absorbance mode using SEC-2000.



# Application in Spectroelectrochemical measurement

SEC-C Thin Layer Quartz Glass Spectroelectrochemical cell Kit



## [Application]

- Analysis of electric charge transfer between electrode and liquid interface
- Spectrometric measurement of electrode surface and interface
- Control and monitoring of chemical substance concentration
- Absorption spectrum of the product and intermediate product
- Concentration, diffusion and lifetime parameter

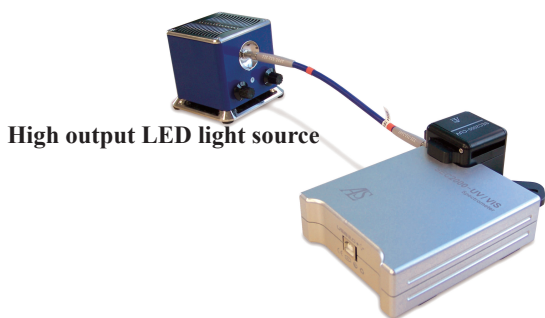
Spectroelectrochemistry (SEC) is aimed at the investigation of electrochemical reaction mechanism and the interface structure between electrolyte solution and electrode. Remarkable progress in this field and related technology enables SEC to be applied in wide areas.

Nowadays, the relation between absorbance and potential for reversible or quasi-reversible system is theoretically elucidated, on which basis the analysis of electrochemical characteristics becomes possible for the system otherwise difficult with only the result of voltammogram. Typical example is redox enzyme cytochrome c and methylene blue.

Catalog No.	Description
011240	SEC-C Thin Layer Quartz Glass Spectroelectrochemical cell Kit
Components	
011498	SEC-C Pt Gauze working electrode
011499	SEC-C Pt counter electrode
011500	SEC-C Thin Layer Quartz Glass cell
011501	SEC-C Teflon Cap
010537	Purge tube (ETFE) 1 m
Optional Products	
012017	SEC-C Au Gauze working electrode
012167	RE-1B Silver-Silver chloride reference electrode
012171	RE-7 Non Aqueous reference electrode

## Optional: Fluorescence and Irradiance measurement

### Fluorescence measurement



Compared with deuterium lamp, optional high output LED light source can easily give single wavelength without utilization of band-pass filter.

### Irradiance measurement



### FOIS-1 Integrating sphere

With the connection of the FOIS-1 to the SEC2000 spectrometer, it could be possible to have the light excitation wavelength in a range area of 360 degrees. The relative output of the LED color could be measured. The irradiance of the illuminant, as solar light, could be accumulated in a range area of 180 degrees, in terms of the direct connection of the optical fiber with SMA terminal to the CC-3.

## Optical fiber probe

### Reflection probe

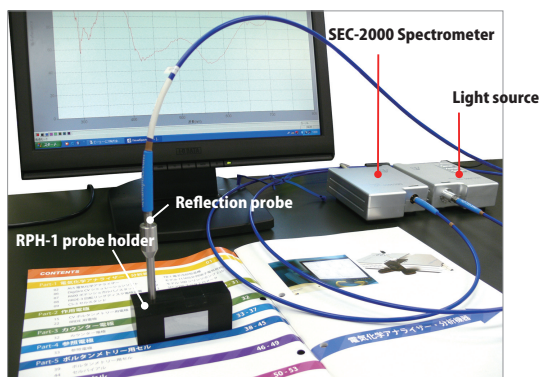
You could measure the regular reflection of the surface, diffuse reflection, backscattering of liquid and particle, and fluorescence, with the direct connection of the reflectance light measurement probe to the SEC2000 Spectrometer and light source.

Catalog No.	Description
010212	R200-7-UV/VIS Reflection probe
010503	R400-7-UV/VIS Reflection probe
010462	RPH-1 Reflection probe holder

### Transmission Dip Probe

There is a tip, in the extremity of the probe, which is appropriate for the direct measurement of the spectrometry of the solution. It is the best system for monitoring the variation in a determined time. Using the Visual Spectra Analysis software, it could be possible to save automatically the value of the spectrum variation and the spectrogram in a determined wavelength.

Catalog No.	Description
010455	T300-RT-UV/VIS Transmission dip probe



# Specification

Model		SEC2000-UV/VIS	SEC2000-VIS/NIR
Catalog No.		012196	012197
Spectrometer	Description	SEC2000-UV/VIS	SEC2000-VIS/NIR
	Detector	2048 pixels CCD array	
	Wavelength range	220 ~ 800 nm	400 ~ 850 nm
	Grating	Blazed at : 400 nm	Blazed at : 500 nm
	Resolution	1.8 ± 0.2 nm : standard slit (50 x 1000 μm) *1	
	Accuracy	< 1% at a Abs	
	Dark noise	< 2 mAbs	
	A/D resolution	14 bit	
	Optical entrance	SMA905; fiber optic : core diameter : 0.5 mm, NA = 0.22	
	Interface	USB 2.0	
	Operating system	Windows™ XP	
	Dimension (W x D x H)	98×118×35 mm	
Cell Holder		SEC2000-CUV	SEC2000-CUV-D
Light Source	Description	SEC2000-DH	SEC2000-TH
	Type	Deuterium & Tungsten Halogen *2	Tungsten Halogen
	Spectral range	200 – 1100 nm (Halogen + D2)	360 ~ 2000 nm
	Power consumption (240 nm)	5 x 10 <sup>-8</sup> W/nmsr	-
	Stability	1 x 10 <sup>-3</sup> AU	-
	Drift	< 0.25% h	-
	Bulb life	1000 hr (D2 Lamp) *3 2000 hr (Halogen Lamp)	1500 hr
	Lamp description	SEC2000- DH bulb	SEC2000-TH bulb
	Others	SMA (Optional) *4	SMA905 *5
	Dimension (W x D x H)	98×118×35 mm	

\*1 – Slit could be selected from: 10, 25, 100, 200 μm. \*2 – Standard SEC2000-DH does not include optic fiber connector. Selection of SMA905 type SEC2000-DH is possible. \*3 – Value for less than 50% power consumption of 240 nm. \*4 – SEC2000-DH does not include optic fiber connector. You could have as an optional. \*5 – SEC2000-TH includes optic fiber connector (SMA905).



- Please read "Manual" carefully before operation.
- Please do not look any light prot under running light source.
- Do not touch with heated light source for prolonged use.

RoHS  
complaint

Earth Friendly

European Union (EU) regulation of hazardous substances have been the "RoHS Directive" supports.

## High output LED light source (Optional)



Description	Wavelength	FWHM*1	Output fiber-coupled (connecting fiber at 600 μm*)	Max Intensity (C.W.)	Intensity (Pulse)	Duty
LLS-250	250 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-270	270 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-290	290 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-310	310 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-325	325 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-345	345 nm	12 nm	20 μW	30 mA	200 mA	1% <sup>2</sup>
LLS-365	365 nm	9 nm	2.5 mW	500 mA	1000 mA	50%
LLS-385	385 nm	10 nm	2.5 mW	500 mA	1000 mA	50%
LLS-405	405 nm	14 nm	1 mW	500 mA	1000 mA	50%
LLS-455	455 nm	20 nm	1.5 mW	1500 mA	3000 mA	50%
LLS-470	470 nm	25 nm	1.5 mW	1500 mA	3000 mA	50%
LLS-505	505 nm	30 nm	1.5 mW	1500 mA	3000 mA	50%
LLS-530	530 nm	35 nm	1.5 mW	1500 mA	3000 mA	50%
LLS-590	590 nm	14 nm	1.5 mW	700 mA	1400 mA	50%
LLS-617	617 nm	20 nm	1.5 mW	700 mA	1400 mA	50%
LLS-627	627 nm	20 nm	1.5 mW	700 mA	1400 mA	50%
LLS-Cool White	6500 K CCT	N/A	1.5 mW	1500 mA	3000 mA	50%
LLS-Neutral White	4100 K CCT	N/A	1.5 mW	1500 mA	3000 mA	50%
LLS-Warm White	3000 K CCT	N/A	1.5 mW	1500 mA	3000 mA	50%

\*1 – Full width at half maximum; \*2 – Pulse length, 500 μs pre-set.

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