SEC2020 SPECTROMETER SYSTEM
USER'S GUIDE
- DEVICE -

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

Document Version: 2.5.0

Last Revision:July, 2019

Contents

1. SEC2020 Spectrometer system

The SEC2020 Spectrometer system is a compact spectrometer system developed by ALS Co, .Ltd and provided by BAS Inc. One unit can measure a wide wavelength range from ultraviolet to near infrared (UV/VIS/NIR) with high sensitivity, corresponding to optical measurements such as spectrum, absorbance, transmittance, reflectance , fluorescence, light source and concentration.

In addition, BAS, which also provides electrochemical measuring instruments, may also offer know-how for spectroelectrochemical measurement, electrochemical measurements combined with spectroscopy.

* Optional products may be prepared separately.

2.   General Information

2-1 User Updates

In order to receive any updated information about product, and valuable information related to current and other ALS products, please register your e-mail address at our local distributors. We would like to know about your present status and interests regarding electrochemical analysis.

2-2 Technical changes

We reserve the right to make technical changes to improve the instrument without notice.

2-3 Damaged shipment

Breakage of any part of this instrument during shipping should be reported immediately to the freight handler and ALS Customer service.
It is necessary to keep the original packing box and contents for inspection by the freight forwarder. ALS will replace any new instrument damaged in shipping with an identical product as expediently as possible after the claim filing date. Claims not filed within 7 days after shipping may be invalid.
Do not return damaged goods to ALS directly. Please contact with your local distributor informing them of its damaged status.
They will contact with our service department.

2-4 Product warranty

ALS Co., Ltd warrants equipment manufactured by the company to be free from defects in material and workmanship for a period of 90 days from the date of shipment. This assumes normal usage under commonly accepted operating parameters. ALS agrees to either repair or replace, at its sole option and free of part charges to the buyer, any parts of such instrumentation which, under proper and normal conditions of use, prove to be defective within 90 days from date of shipment. Electrochemical cells and working electrodes are warranted for 30 days.
ALS neither assumes nor authorizes any person to assume for it any other liability in

connection with the sale, installation, service, or use of its instrumentation.

All products manufactured by ALS are tested and inspected prior to shipment. Upon prompt notification by the buyer, ALS will correct any defects in warranted equipment by its manufacture either by return of the item to our factory, or shipment of a repaired or replacement part. ALS will not be obliged, however, to replace or repair any piece of equipment which has been abused, improperly installed, altered, damaged or repaired by others. Defects in equipment do not include decomposition, wear, or damage by chemical action or corrosion.

This instrument is manufactured, either wholly or in part, for research purposes only. Use in medical diagnosis is not intended, implied or recommended by the manufacturer. Use for this purpose and accountability for the same rests entirely with the user.

Limited obligations covered by this warranty include:

In the case of instruments not of ALS manufacture, the original manufacturer's warranty applies.

Shipping charges under warranty are covered only in one direction. The buyer is responsible for shipping charges to the factory, if return of the part is required.

Expendable items including disposable items such as working electrode, reference electrodes, source lights, panel lights, fuses, etc. are excluded from the warranty

2-5 Service information

ALS provides a skilled service staff to solve your equipment oriented problems. For further details, please contact us by e-mail (sales@als-japan.com).

Following discussion of your specific difficulties, an appropriate course of action will be described and the problem resolved accordingly.

Please contact with local distributor and describe to them the problem you are having in full detail.

They will obtain a RETURN MERCHANDISE AUTHORIZATION NUMBER (RMA#). The RMA# identifies you as the sender. All correspondence and shipments should be sent to ALS.

3. System configuration

SEC 2020 spectrometer system consists of four basic accessories. It consists of SEC 2021 spectrometer, SEC 2022 deuterium halogen light source, SEC 2023 cuvette holder, and SEC 2024 platform.

Spectrometerer   Cuvette holder   Light source

Platform

	Description	Qty
1	SEC2021 Spectrometer	1
2	SEC2022 Deuterium halogen light source	1
3	SEC2023 Cuvette holder	1
4	SEC2024 Platform	1
5	AC adaptor	1
6	Power cable	1
7	USB cable	1
8	Collimator	2
9	Fiber collimator	1
10	Platform screw	7
11	External device connection trigger cable	1
12	Trigger cable	1
13	Plastic cuvette	1
14	SMA905 adaptor for light source	3
15	SMA905 adaptor for light shielding	2
16	Hexagon wrench0.89mm	1
17	Hexagon wrench1.50mm	1
18	Software (USB memory)	1
(19)	Quick manual	1
(20)	Wavelength Calibration Data Sheet	1
(21)	Linearity Test Data Sheet	1
(22)	Waterproof box	1
(23)	Warranty certificate	1

Figure 3-1: Configuration and List of accessories

![ALS Co., Ltd Electrochemistry & Spectroelectrochemistry]

SEC2021 Spectrometer

SEC2020 Spectrometer system is equipped with SEC 2021 spectrometer as standard content. With highly functional grating and optical design, it is possible to measure a wide wavelength range from ultraviolet to near infrared (UV / VIS / NIR) with high sensitivity with one unit.

Figure 3-2: SEC2021 Spectrometer

Spectrometer specification	
Description	SEC2021-025-DUVN
Detector	2048 element linear silicon CCD array
Wavelength range	200 – 1025 nm
Grating	Blaze wavelength (300 nm)
Slit	25 µm
Wavelength resolution	1.3 nm
Fiber connector	SMA905 Core diameter: 600 µm NA = 0.22
Interface	USB 2.0
Operating system	Windows TM 7/8.1/10, 32/64 bit
Size (W x D x H)	86 x 110 x 32 mm

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

I/O Port Pin

The Pin number of the I/O port for the spectrometer controlling is showing below:

Pin No.	Signal	Definition	Function
1	Power	5V Output	When connecting to the PC's USB port, this pin is connected to VBUS. Up to 100 mA current
2	No connection		
3	No connection		
4	Output	Shutter	Shutter ON/OFF
5	Output	D2_ON	D2 light source ON/OFF
6	Output	HAL_ON	Halogen light source ON/OFF
7	Input	Trigger-IN	TTL
8	GND	GND	Ground
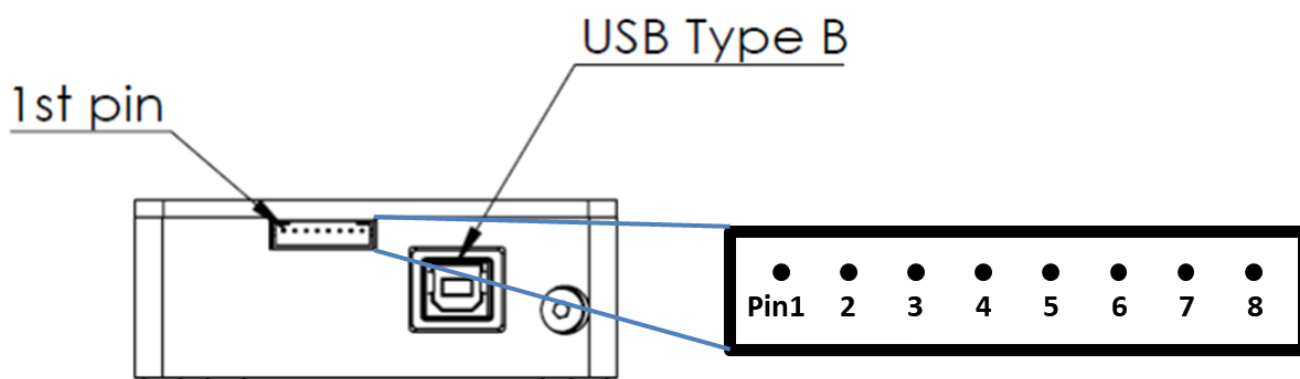
Figure 3-3: SEC2021 Spectrometer Port Pin number

SEC2022 Deuterium Halogen light source

SEC2020 Spectrometer system is equipped with SEC 2022 deuterium halogen light source as standard content.
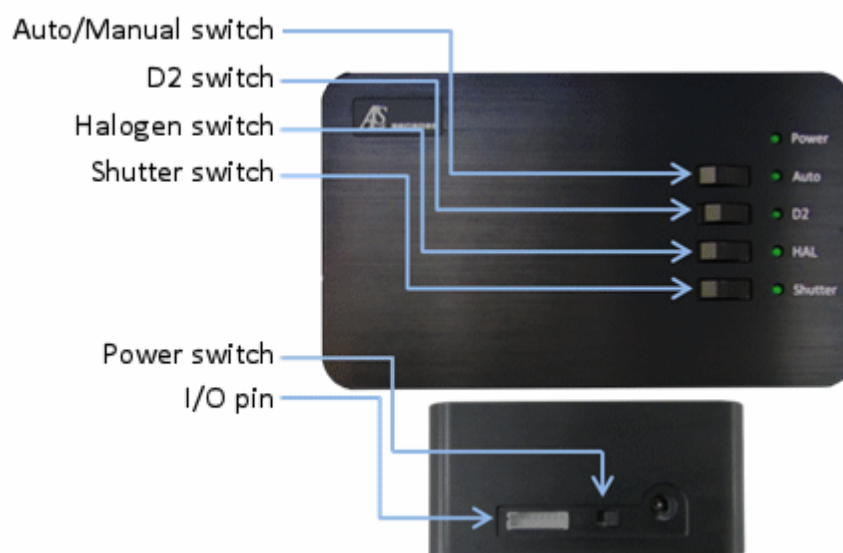
Figure 3-4: Switch location for the light source

Light source specification	
Description	SEC2021-025-DUVN
Light type	Deuterium halogen light source
Wavelength range	200 – 1700 nm
Stability	< 0.1 %
Drift	< 0.25 % h
Bulb life	> 1000 h (D2 lamp) > 2000 h (halogen lamp)
Fiber connector	SMA905
Size (W x D x H)	100 x 165 x 46 mm

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

Manual mode:

1. Connect the power cord and turn on the power switch. When the switch is on, the power LED lights up.
2. Set the auto/manual switch to the left side, the auto/manual LED lights off.
3. Next, slide the D2 switch or halogen switch to the right according to the purpose, and one or both LED lights up.
4. When the shutter switch is set to the right and the LED lights up, the optical path opens and it will be in measurement state. When the shutte switch is set to the left and the LED lights off, the optical path is cut off and it will be setting as dark spectrum state.

Automatic mode:

1. Connect the spectrometer and the light source with the trigger cable.
2. Connect the spectrometer and the PC with USB cable.
3. Turn on the power switch of the light source and slide the auto/manual switch to the right side, the LED lights up.
4. SpectraSmart controls D2, halogen and shutter operation. Check ON/OFF of each switch by LED status.

Caution: Turning on the power switch before connecting the ligth source control trigger cable, it does not work properly. Please be careful to turn on the light source only after connecting the light source control trigger cable.
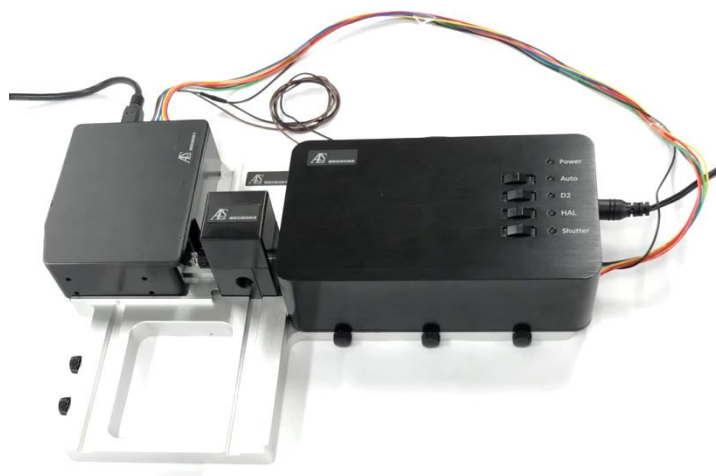
Figure 3-5: Connection of the light source control trigger cable

I/O Port Pin

The Pin number of the I/O port for the light source controlling is showing below:

| Pin No.	Signal	Definition	Function
1	No connection		
2	No connection		
3	No connection		
4	Input	Shutter	Shutter ON/OFF
5	Input	D2_ON	D2 light sourceON/OFF
6	Input	HAL_ON	Halogen light source ON/OFF
7	No connection		
8	GND	GND	Ground
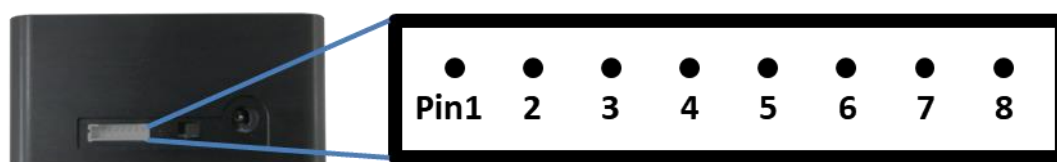
Figure 3-6: Pin number for the deuterium halogen light source

SEC2023 Cuvette holder

It is used to set the cuvettes and plate samples inside. It can also be connected to the collimator, fiber collimator or optical path, as well as the SMA905 adaptor for light shielding.

Figure 3-7: Cuvette holder

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

SEC2024 Platform

Fixing the SEC2021 Spectrometer, 2022 Deuterium halogen light source, and SEC2023 Cuvette holder onto the SEC2024 Platform, it enables a stable installation of the instrument. (※)
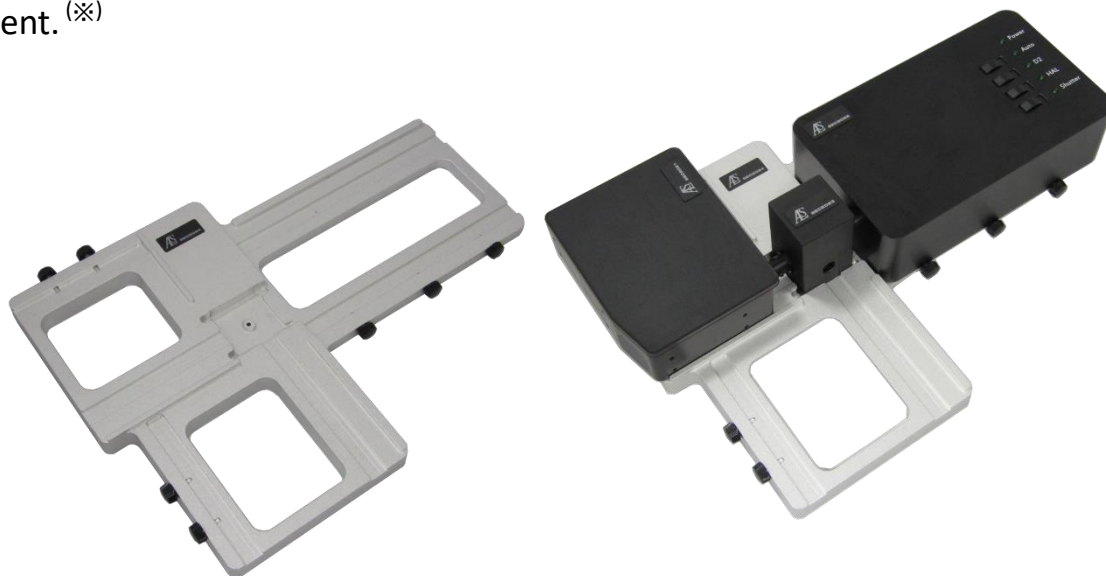
Figure 3-8: Platform for instrument fixing

※Fix the devices by screwing the instrument from the side with the platform screw.
Caution! Please be careful to do not lift the device, because there is a possiblity that it come off, even after fixing.

AC adaptor and Power cable

It is an AC adaptor and Power cable for the SEC2022 Deuterium halogen light source.

Power supply specification	
AC input range	100 – 240 V
DC output range	12 V (max. 3.34 A)

USB cable

It is used for the connection of the SEC2021 Spectrometer to the PC.

Collimator

It is used as a fitting when connecting SEC2023 Cuvette holder and SMA905 compatible optical fiber. And the connected collimator lens can extract light from ultraviolet and visible light source in parallel. If light is irradiated from the opposite side, it can be focused on a pinhole. In addition, you can adjust the focal position, by loosening the fixing screw using the supplied hexagonal wrench and sliding the inner cylinder.

Fixing screw

Figure 3-9: Collimator

Fiber collimator

Connecting as a joint between SEC2023 Cuvette holder and SEC2021 Spectrometer, light uptake efficiency is increased. For measurements using cuvette holders, the use of fiber collimator is recommended. In addition, you can adjust the focal position, by loosening the fixing screw using the supplied hexagonal wrench and sliding the inner cylinder.

Fixing screw

Figure 3-10: Fiber collimator

External device connection trigger cable

Connecting the SEC2021 Spectrometer and external device with an External device connection trigger cable, the START/STOP of the spectrometer measurement can be controlled by measuring operation external device.

Figure 3-11: External device connection trigger cable

Trigger cable

Connecting the SEC 2021 Spectrometer and the SEC 2022 Deuterium halogen light source with this cable, ON/OFF control of D 2 and halogen lamp and shutter switch can be controlled by SpectraSmart. Connect the connector with all cords connected to the pin to the SEC2021 Spectrometer and connect the other connector to the SEC2022 Deuterium halogen light source.

Also, the two free cords, like the External device connection trigger cable, can control the spectrometer measurement with the operation of the external devices. Connect the black cord to the ground of the external device and the brown cord to the trigger out of the external device.

Figure 3-12: Trigger cable

Plastic cuvette

Cuvette used for absorbance, transmittance, fluorescence and concentration of gas or liquid samples measurement. Other 10 mm square cuvettes, in glass quartz or similar, can be for the measurement.

SMA905 adaptor for light source

It is used as a fitting when connecting SEC 2023 cuvette holder and fiber with SMA905 connector.

Figure 3-13: SMA905 adaptor for light source

SMA905 adaptor for light shielding

When measuring with the SEC2023 cuvette holder, it is used to block the external light.
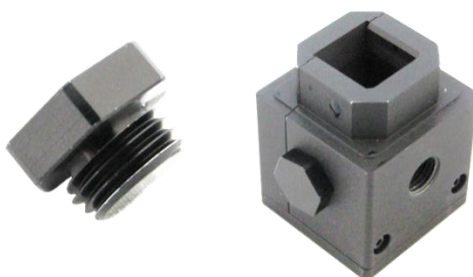
Figure 3-14: SMA905 adaptor for light shielding

Hexagon wrench

It is used for loosen of the fixing screw attached to the housing of the collimator lens, to adjust the focal position of the collimator lens. The 0.89 mm wrench corresponds to a collimator, and the 1.50 mm wrench corresponds to a fiber collimator.

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

Software (USB memory)

Software (SpectraSmart) for the SEC2020 Spectrometer system to be installed.

Quick manual

SEC 2020 Spectrometer system content list, SpectraSmart installation and measurement setting method are briefly introduced.

Wavelength Calibration Data Sheet

SEC2021 Spectrometer is calibrated at the factory before shipment, and low mercury lamp is used as the reference light source. In SEC 2020, calibration is carried out with higher degree polynomials using mercury's representative bright lines.

Linearity Test Data Sheet

Before shipment, the CCD sensitivity of the SEC 2021 spectrometer is not linear with respect to intensity, and sensitivity varies depending on individual CCDs. Therefore, each spectrometer is subjected to linearity correction, and the linearity correction table is stored in each spectrometer.

Waterproof box

Waterproof box for the storage of all contents of the instrument, and can be used for the easily carry of the system.

Warranty certificate

Based on this warranty certificate, the repair will be free of charges for one year from the purchase date.

4.   Instrument setting for absorbance/transmittance measurement

Absorbance is calculated from the original light source spectrum and the spectrum when the irradiation light of the light source passes through the sample to be measured. Therefore, to measure the absorbance, first measure the spectrum of the light source, then set the sample to be measured and measure the light that passed through them. When the measurement is completed, the program automatically calculates the absorbance spectrum.

The transmittance is also calculated from the spectrum of the light source and the spectrum after it has passed through the sample to be measured. When the measurement is completed, the program automatically calculates the transmittance spectrum.

Example: 1. Using cuvette

Set the cuvette containing the sample (gas or liquid) and measure the absorbance and transmittance. Also, by switching to the concentration mode, quantitative analysis of concentration is also possible.

Configuration example

PC (sold separately)
SEC2021 Spectrometer
SEC2022 Deuterium halogen light source
SEC2023 Cuvette holder
SEC2024 Platform
Platform screw
Fiber collimator
SMA905 adaptor for light shielding
Plastic cuvette

Figure 4-1: Absorbance/Transmittance measurement example using cuvette

ALS Co., Ltd
Electrochemistry & Spectroelectrochemistry

① First, set the spectrometer and light source as shown in Figure4-1. Connect the fiber collimator to the cuvette holder and connect it to the spectrometer. Fix it with platform screws on the platform. Connect the SMA905 adaptor for light shielding to the side of the cuvette holder. When placing the light source on the platform, fix with the platform screw at the position where the light irradiation port is closest to the cuvette holder.

② Turn on the light source and turn on the D2 and halogen lamps. Wait from 20 to 30 minutes until the light source stabilize.

③ Open the SpectraSmart software, and then open the shutter, set the cuvette containing solvent or gas to the cuvette holder, and acquire the reference spectrum[※].

④ While setting the cuvette, close the shutter (do not turn off the light source), and acquire the dark spectrum[※].

⑤ Open the shutter and set the cuvette containing the sample to be measured into the cuvette holder and perform the measurement.

※For the acquisition method, please refer to SpectraSmart User's Guide.

Example: 2. Using thin film

Set the thin film in the cuvette holder and measure the absorbance and transmittance.

Configuration example

PC (sold separately)
SEC2021 Spectrometer
SEC2022 Deuterium halogen light source
SEC2023 Cuvette holder
SEC2024 Platform
Platform screw
Fiber collimator
SMA905 adaptor for light shielding

Figure 4-2: Absorbance/Transmittance measurement example thin film

① Set the instrument in the same way as measurement using cuvette.
② Warming up the light source in the same way as measurement using cuvette.
③ Open the SpectraSmart software, and then open the shutter, slide the side of the cuvette holder and set the reference film or make air as reference spectrum[※].
④ Close the shutter and acquire the dark spectrum[※].
⑤ Open the shutter, set the thin film to be measured, and perform the measurement.

※For the acquisition method, please refer to SpectraSmart User's Guide.

Figure 4-3: Side of the cuvette holder

Example: 3. Using probe

Since immersion probe is measured by immersing the probe directly in the sample, troublesome sampling is unnecessary. 2, 5, 10, 20 mm optical path length tip are available.
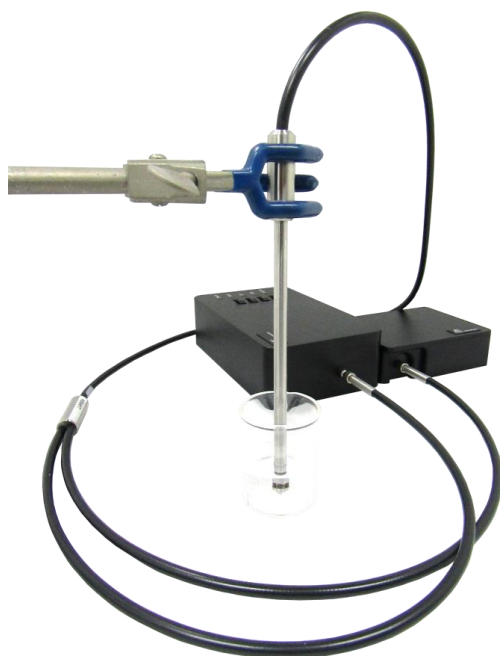
Configuration example

PC (sold separately)
SEC2021 Spectrometer
SEC2022 Deuterium halogen light source
5.4mm Monocoil all legs, Low Sol 300um UV, 1.5m Total length with round nut
PD-U10 10mm tip

Figure 4-4: Absorbance/Transmittance measurement example using transmission dip probe

① Transmission dip probe has two branches which is connected to the spectrometer and light source.

② Warming up the light source in the same way as example: 1.

③ Open the SpectraSmart software, open the shutter and immerse the transmission dip probe in a container, containing solvent or solution. At this time, remove bubbles adhering to the optical path tip and acquire the reference spectrum[※].

④ Keep immersed, close the shutter and acquire the dark spectrum[※].

⑤ Open the shutter, immerse the transmission dip probe in the solution to be measured, and perform the measurement.

※For the acquisition method, please refer to SpectraSmart User's Guide.

5.   Instrument setting for reflectance measurement

Reflectance is calculated from the spectrum of the light source and the spectrum reflected on the object to be measured. Since it is necessary to irradiate stronger light to detect the reflected spectrum, a separate high power light source is required. Similar to the measurement of absorbance, to measure the reflectance, first measure the spectrum of the light source and then measure the light reflected on the object to be measured. When the measurement is completed, the program automatically calculates the reflectance spectrum.

Application example using relectance probe

Color analysis of objects can be performed by measuring the reflected light spectrum. The optical fiber of the light source and the optical fiber for measurement are incorporated into the reflected light measurement probe, and the reflection spectrum measurement can be performed simply by fixing with a dedicated probe holder.

Configuration example

PC (sold separately)
SEC2021 Spectrometer
HL-2000-LL (sold separately)
R200-VIS/NIR (sold separately)
RPH-1 Reflection probe holder (sold separately)
WS-1 Diffuse reflectance standard

Figure 5-1: Reflectance measurement using reflection probe

① Reflection probe has two branches which is connected to the spectrometer and light source.

② Warming up the light source in the same way as example: 1.

③ Open the SpectraSmart software, open the shutter and place the reflection probe holder on reflectance standard plate. Insert the probe into the hole drilled at 45 degrees, fix the probe tip to the position where the spectrum intensity becomes maximum and acquire the reference spectrum[※].

④ Close the optical path and acquire the dark spectrum[※].

⑤ Open the optical path, place the probe holder on the sample to be measured, and start measurement.

※For the acquisition method, please refer to SpectraSmart User's Guide.

6.   Instrument setting for fluorescence measurement

By irradiating and exciting the fluorescent sample with LED light, the irradiated weak fluorescence spectrum of the sample is detected at a 90 degree angle. In this case, a strong excitation light is required, so we recommend an optional high power LED light source.

Application example using high power LED
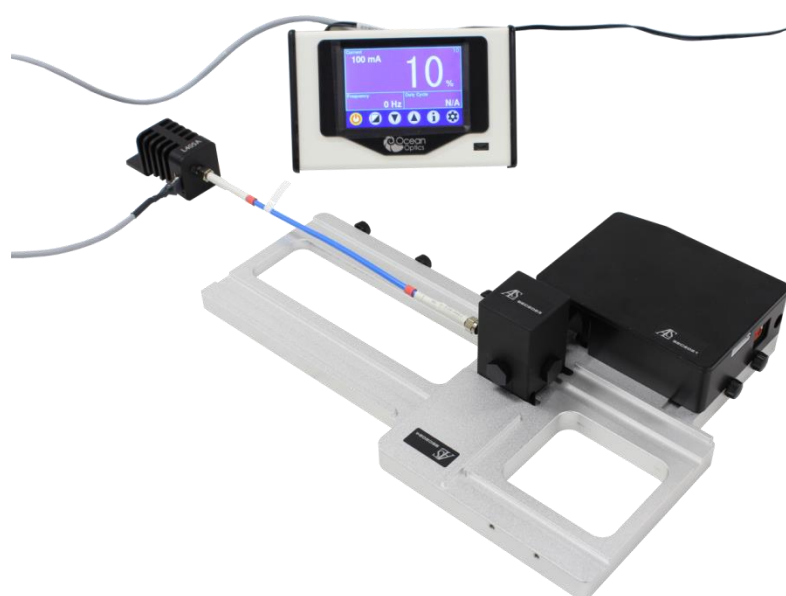
Configuration example
PC (sold separately)
SEC2021 Spectrometer
SEC2023 Cuvette holder
Fiber collimator
SMA905 adaptor for light source or Collimating lens (sold separately)
SMA905 adaptor for light shielding or   Mirror screw plug (sold separately)
LMS Series High power LED light source (sold deparately)
600-micron Fiber, solarization-resistant, 25 cm (sold deparately)

Figure 6-1: Fluorescence measurement using high power LED light source

①The spectrometer and the light source are set as shown in Figure6-1.
Set the fiber collimator to the cuvette holder and connect it to the spectrometer. And, then set it to the plataform, and fix with the platform screws. In addition, attach the collimator lens or the SMA 905 adapter for light source to the cuvette holder optical path, at a 90 ° position, and connect the LED light source with a optical fiber. Attach the light shielding adapter to the remaining open optical path sides of the cuvette holder. Moreover, by preparing a mirror plug for fluorescence measurement in place of the light shielding adapter, it is possible to obtain greater fluorescence intensity.

②Turn on the LED light source and adjust the knob of the lish intensity.

③Open the SpectraSmart software and set to the spectrum mode.

④Set the solution containing the fluorescent substance in the cuvette holder and perform the measurement.

7. Instrument setting for light source measurement

Emission intensity measurement is used for LED evaluation, lighting, etc. It is measured in units of watts or lumens. Since we are measuring the direct light source, we do not need the light source for reference. Once the emission intensity is measured, the program automatically creates the spectrum of theemission intensity.

Emission intensity measuremen for specific irradiation range measurement

Configuration example

PC (sold separately)
SEC2021 Spectrometer

Figure 7-1: Emission intensity measurement of LED lamp

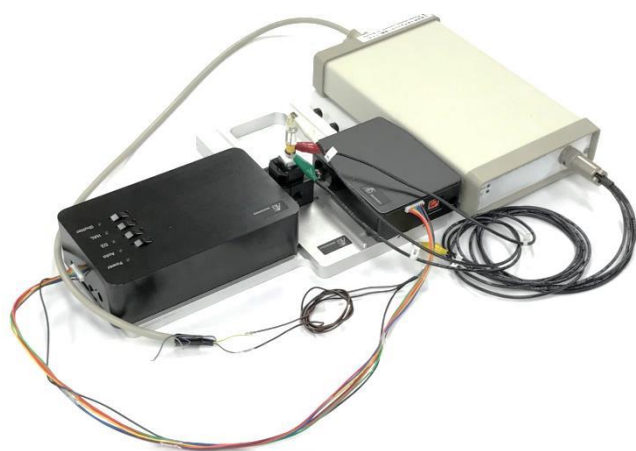① First, as shown in Figure7-1, irradiate the light source to be measured to the light receiving port of the spectrometer.

② Open the SpectraSmart software. Set to the emission intensity measurement mode and acquire the dark spectrum with the measurement part of the spectrometer shielded from light$^{(※)}$.

③ Open the optical path and start measurment.

※For the acquisition method, please refer to SpectraSmart User's Guide.

8. Synchronization with other instruments

The spectrometer supports **Trigger Mode** for syncronized measurement with external device. Depending on the trigger mode, you can control acquisition of spectrometer data with external Input/Output signal. It is a function developed to synchronize spectroscopic measurement and time measurement with external measurement.

This time, we will introduce measurement over time of absorbance measurement by taking combination with electrochemistry as an example.

Configuration example
PC (sold separately)
SEC2021 Spectrometer
SEC2022 Deuterium halogen light source
SEC2023 Cuvette holder
SEC2024 Platform
Platform screw
Fiber collimator
SMA905 adaptor for light shielding
Trigger cable
SEC-C Thin Layer Quartz Glass   Spectroelectrochemical cell kit (Pt) (sold   deparately)
RE-1CP Reference electrode (Ag/AgCl/Saturated KCl)
Model2325 Bi-Potentiostat

Figure 8-1: Spectroelectrochemical measurement using potentiostat

Trigger in: 5V

GRN

Figure 8-2: Triger cable connection in the SEC2021 Spectrometer

Mode of operation:

In the SEC2020 Spectrometer system, START/STOP control is performed on the measurement when a change in the external TTL signal is received. The signal format is a high level method, as shown in Figure8-3. The spectrometer is designed to operate when the external input signal changes from 0 V to 5 V.
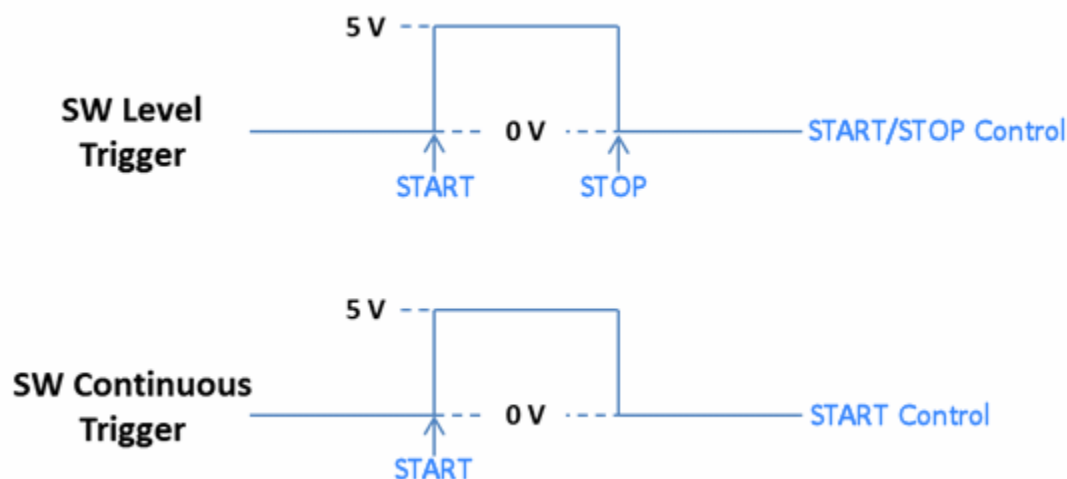

Figure 8-3: Trigger operation schematic of SpectraSmart

① As shown in Figure8-2, black cable is Ground (GND) and brown cable is Trigger In terminal. Please connect with each potentiostat terminal. For Model 2325 Bi-Potentiostat, connect DGND to the Ground terminal of SEC2020 and V_RDE to the Trigger In terminal from the 9 pin terminal on the back, as shown in Figure8-4.
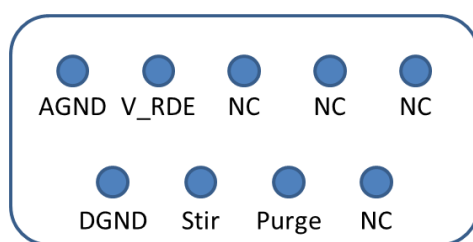

Figure 8-4: 9 pin sub-D terminal of Model 2325

② Turn on the power of the Model 2325 Bi-Potentiostat.
   Caution: If you turn on the power of the Model 2325 Bi-Potentiostat before connecting the trigger cable, it will not work properly. Please be careful to turn on after setting the equipment.

③ Since the absorbance will be measured, set the instrument in the same way as Absorbance/Transmittance measurement example: 1. Using cuvette.

④ Warming up the light source in the same way as example: 1.

⑤ As shown in Figure8-1, set the reference solution in a dedicated quartz cuvette and set it in the cuvette holder. Set the working electrode, counter electrode, reference electrode in the cuvette. Open the shutter and acquire the reference spectrum[※].

⑥ Close the shutter and acquire the dark spectrum[※].

⑦ Open the shutter, fill the reference solution and the sample to be measured, set the electrode and set it on the cuvette holder. Connect the cell cable from Model 2325 Bi-Potentiostat to the corresponding working, counter and reference electrode, respectively.

⑧ Set the measurement conditions of **Strip Chart** or **Time Sequence** to be measured from SpectraSmart.

⑨ Select **SW Level Trigger** or **SW Continuous Trigger** in the trigger setting and put it in the measurement standby state.

⑩ Model 2325 is set to transmit external signals of 0 V before and after measurement and 5 V during measurement. Open the **Setup** screen of Model 2325 software. In the case of model 2325, as shown in Fig. 26, enter "Rotation speed (rpm)" of "RDE setting" as 5000, check "RDE rotation" under "Measuring", and click "OK".
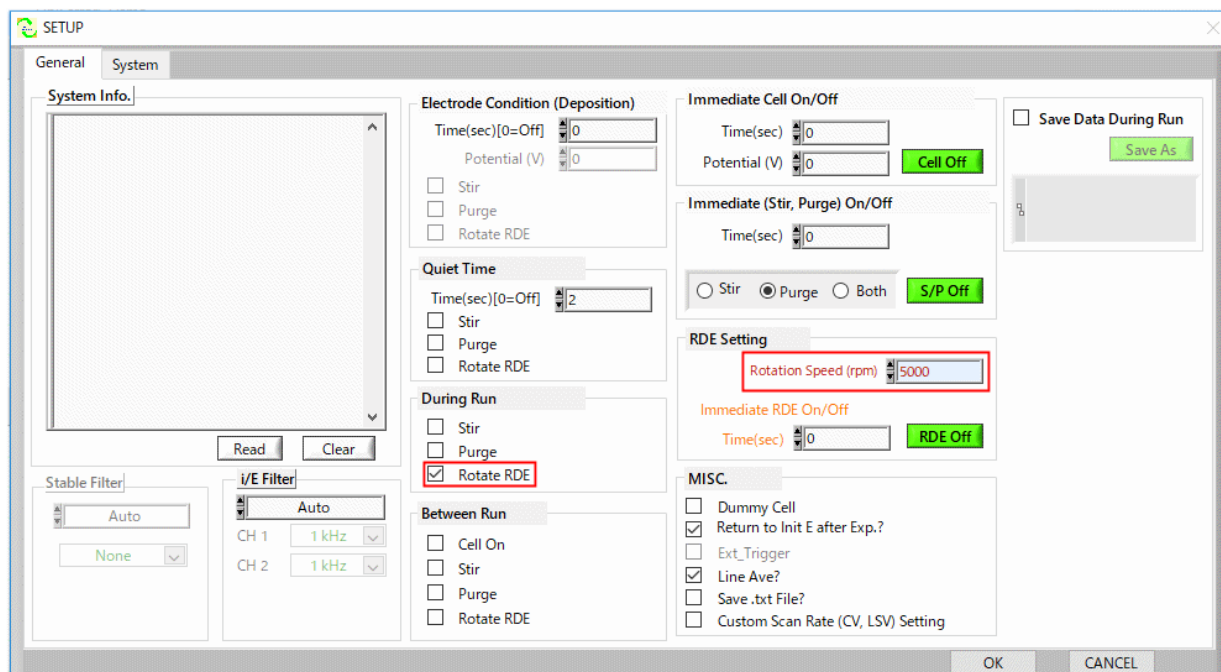

Figure 8-5: Model 2325 setup screen

⑪ By starting measurement from the software of model 2325, simultaneous measurement of absorbance is started at the same time.

⑫ When set to **SW Level Trigger**, absorbance measurement is automatically stopped by terminating the measurement of Model 2325. On the other hand, when **SW Continuous Trigger** is selected, absorbance measurement is stopped manually from software.

※For the acquisition method, please refer to SpectraSmart User's Guide.

9. EU Declarationof Conformity

<div>

EC DECLARATION OF CONFORMITY

Manufacturer's name: BAS Inc.
Manufacturer's address: 1-28-12, Mukojima, Sumida-ku, Tokyo,
                              131-0033, Japan
E-mail: sales@als-japan.com

Declare that the DoC is issued under our sole responsibility and belongs to the following product;

Product Name: UV/Visible Spectrometer system and acceories
Model Number: SEC2020
Serial Number: OS361AC55009057- OS361AC55009278
                   OS361AC55009059- OS361AC55010641
                   OS361AC55009064- OS361AC55009285

The object of the declaration described above is in conformity with the relevant union harmonization legislation;

EMC Directive 2014/30/EU
Low Voltage Directive(LVD) 2014/35/EU
Restriction of the use of certain hazardous substances(RoHS) 2011/65/EU

The following harmonised standards and technical specifications have been applied:

EN61326-1: 2013 Emission and Immunity Requirements
EN61010-1: 2010 + Corrigendum 1: 2011 Safety Requirements
EN61010-2-201: 2013 Safety Requirements
EN50581: 2012 RoHS Requirements

Tokyo, Japan   Mar 8, 2018   Masao Asano
  (Place)   (Date of issues)   name

</div>

10. Contact us

This is the SEC2020 Spectrometer System User's Guide Device Edition. If you have any technical problems or questions, please feel free to contact us.

Manufactured by:

        ALS Co., Ltd

Exclusive distributor:

        BAS Inc.

Address: 1-28-12, Mukojima, Sumida-ku, Tokyo 131-0033, JAPAN
Phone: +81-3-3624-0331
Fax: +81-3-3624-3387
URL: https://www.als-japan.com/
Email: sales@als-japan.com