Spectrophotometer

V-700 series

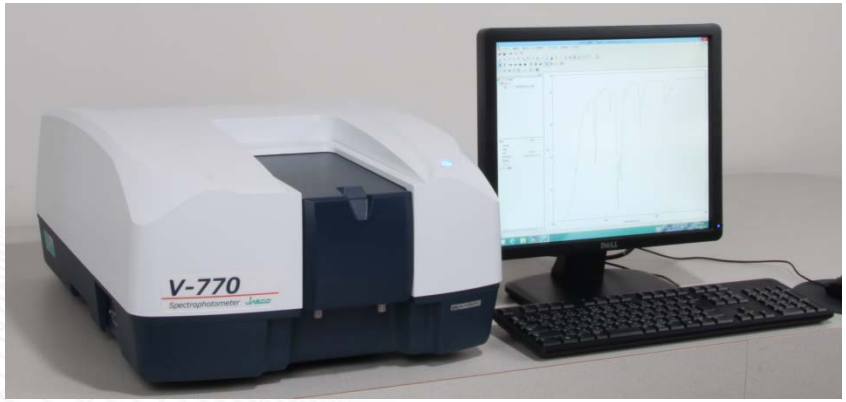
V-700 Series UV-Vis/NIR Spectrophotometers

V-730

- SBW=1.0 nm
- Class-leading high S/N

V-730BIO

- New iRM & Spectra Manager



V-750/760/770

- Wavelength-independent dynamic range

V-780 New!

- Highly sensitive measurement in NIR

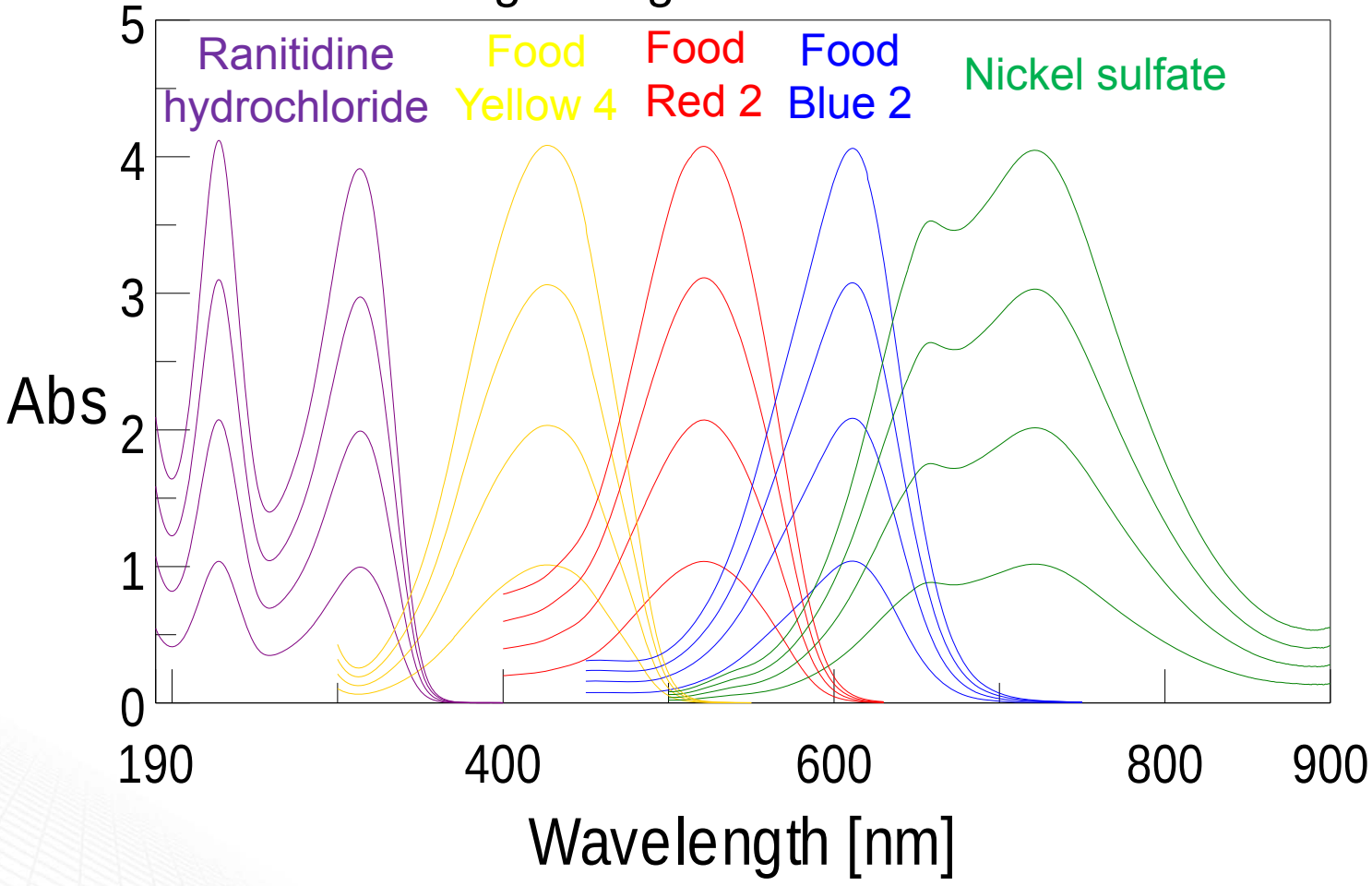
New Features

1. Wavelength-independent dynamic range	*V-750/760/770/780*
2. High resolution as 1.0 nm bandwidth	*V-730*
3. High signal to noise ratio	*V-730/750/760/770/780*
4. New model: High sensitivity in NIR	*V-780*
5. Wide dynamic range in NIR	*V-770/780*
6. Stable measurement platform	*V-730/750/760/770/780*
7. Alignment-free lamp replacement	*V-730/750/760/770/780*
8. Spectra Manager II & CFR	*V-730/750/760/770/780*
9. iRM-1000	*V-730/750/760/770/780*
10.Upgraded accessories	*V-730/750/760/770/780*

1.Wavelength-independent dynamic range

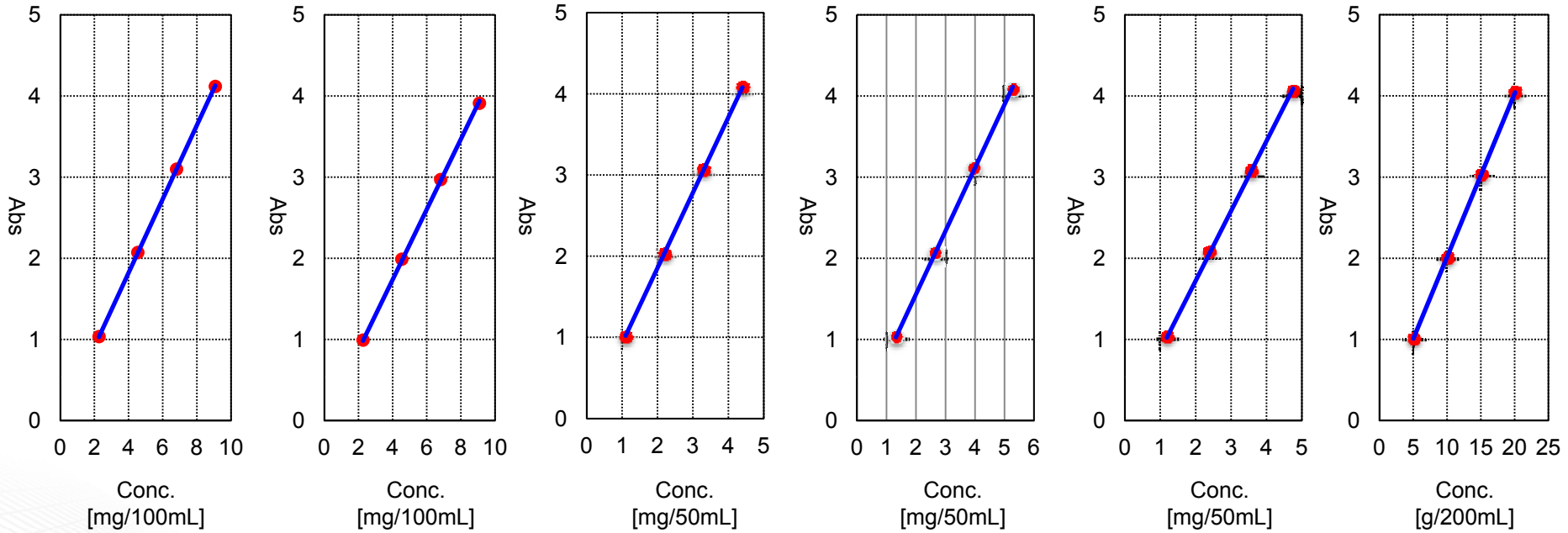
V-750/770/780

Linearity up to 4 absorbance in wide UV-Vis wavelength range



1.Wavelength-independent dynamic range

Ranitidine hydrochloride	Food Yellow 4	Food Red 2	Food Blue 2	Nickel sulfate
228 nm	314 nm	427 nm	522 nm	611 nm	722 nm

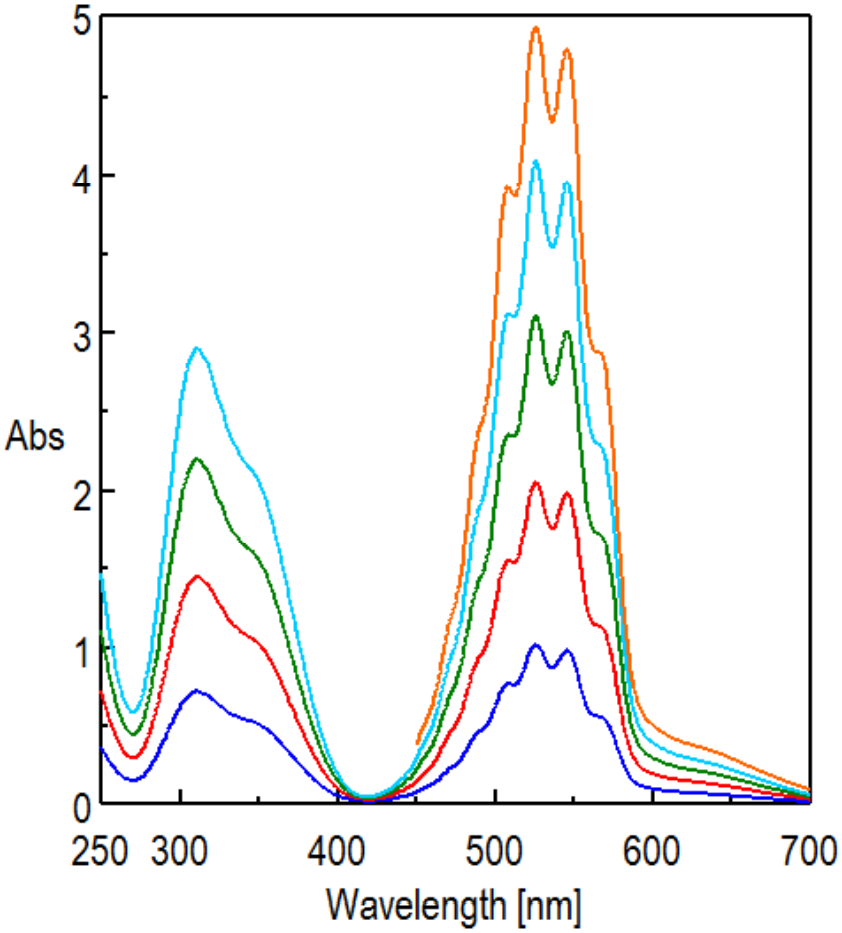


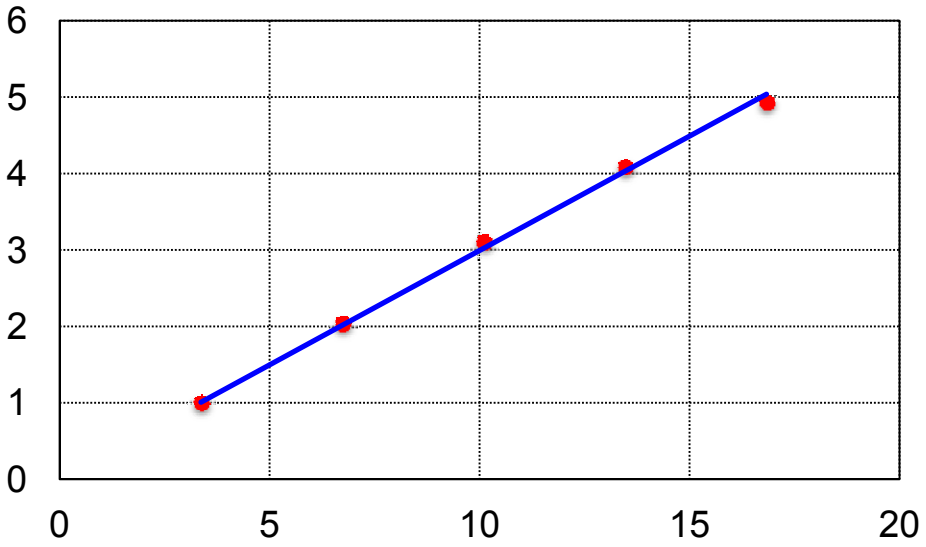
Abs=0.4546・Conc	Abs=0.4337・Conc	Abs=0.9277・Conc	Abs=0.7786・Conc	Abs=0.8611・Conc	Abs=0.2014・Conc
R^2=1.0000	R^2=0.9997	R^2=1.0000	R^2=0.9996	R^2=0.9995	R^2=1.0000

1.Wavelength-independent dynamic range

V-750/770/780

Excellent linearity up to 5 absorbance using $KMnO_4$ solution





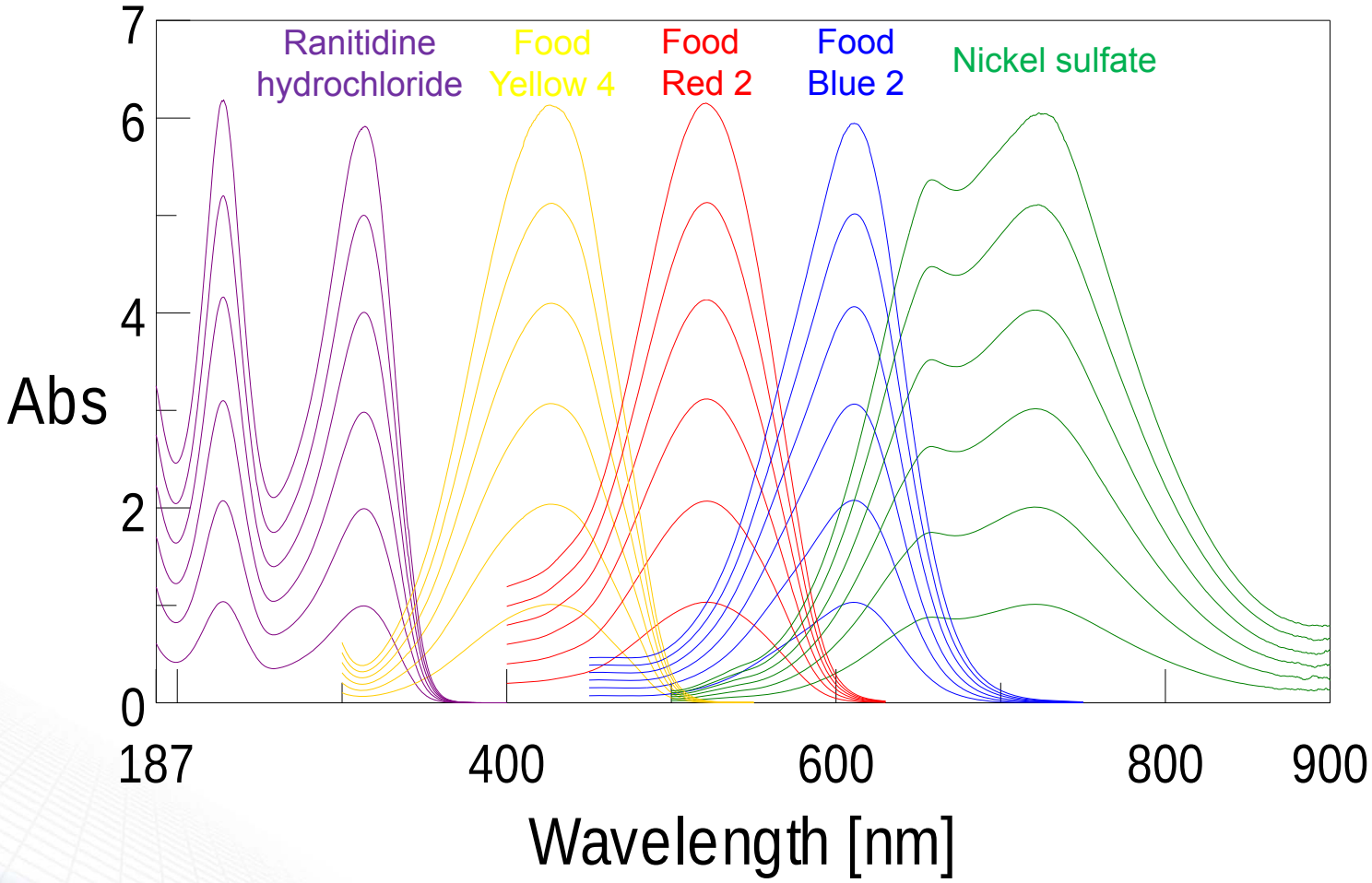
$Abs=0.2993 \cdot Conc$

$R^2=0.9977$

1.Wavelength-independent dynamic range

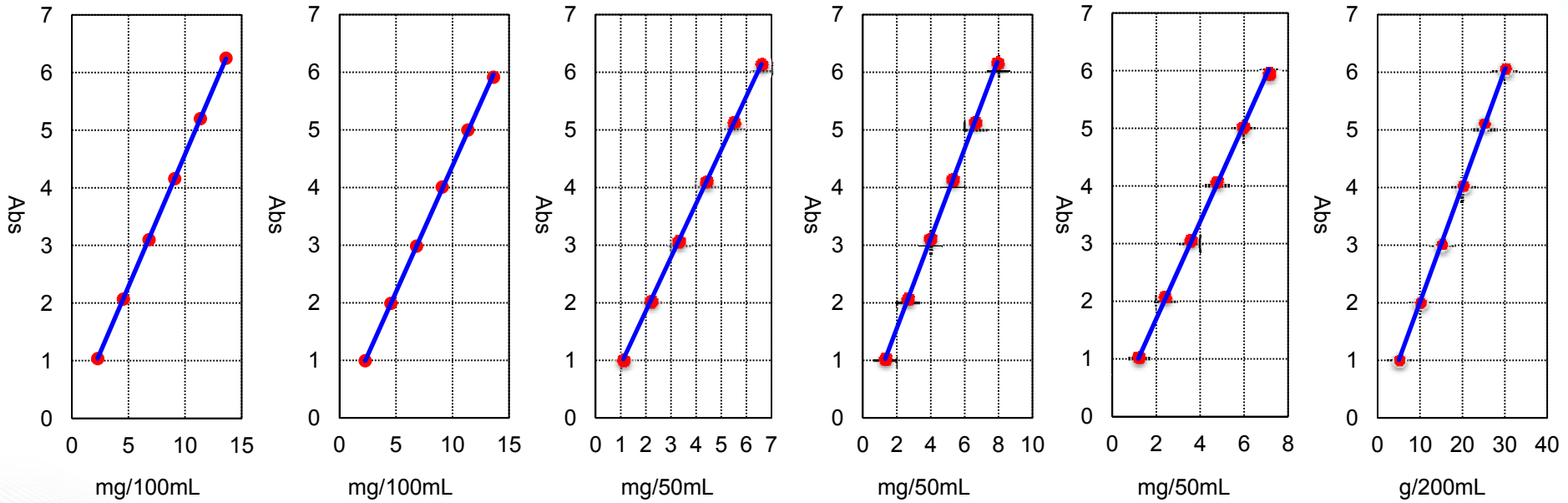
V-760

Linearity up to 6 absorbance in wide UV-Vis wavelength range



1.Wavelength-independent dynamic range

Ranitidine hydrochloride		Food Yellow 4	Food Red 2	Food Blue 2	Nickel sulfate
228 nm	314 nm	427 nm	522 nm	611 nm	722 nm

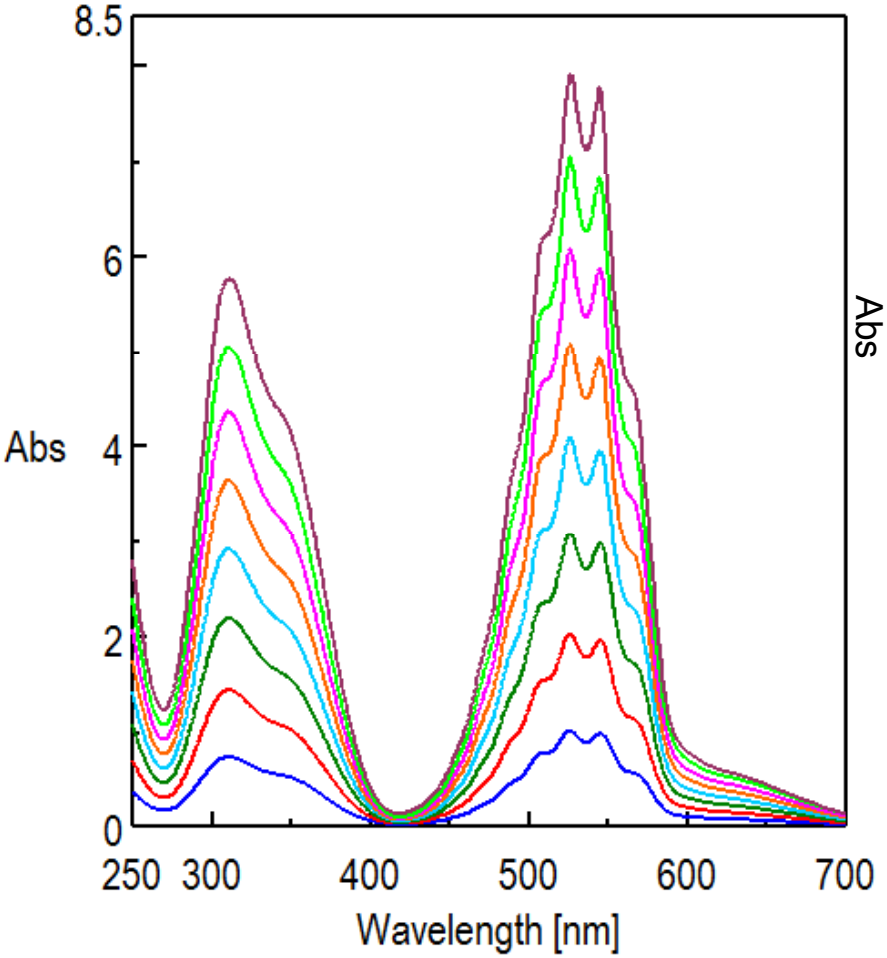


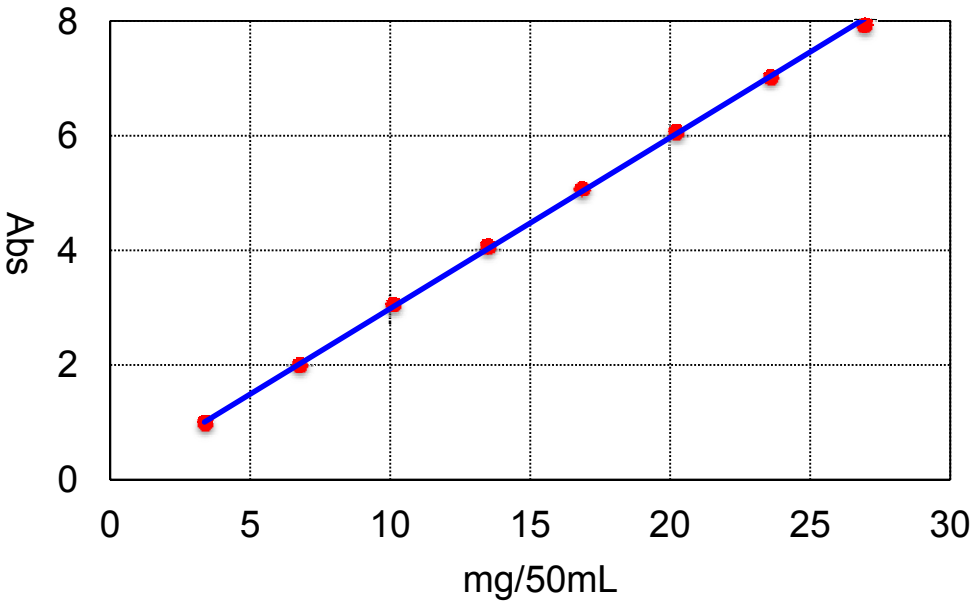
Abs=0.4580・Conc	Abs=0.4379・Conc	Abs=0.9307・Conc	Abs=0.7794・Conc	Abs=0.8457・Conc	Abs=0.2016・Conc
R^2=1.0000	R^2=0.9997	R^2=1.0000	R^2=0.9999	R^2=0.9990	R^2=0.9998

1.Wavelength-independent dynamic range

V-760

Excellent linearity up to 8 absorbance using $KMnO_4$ aqueous solution



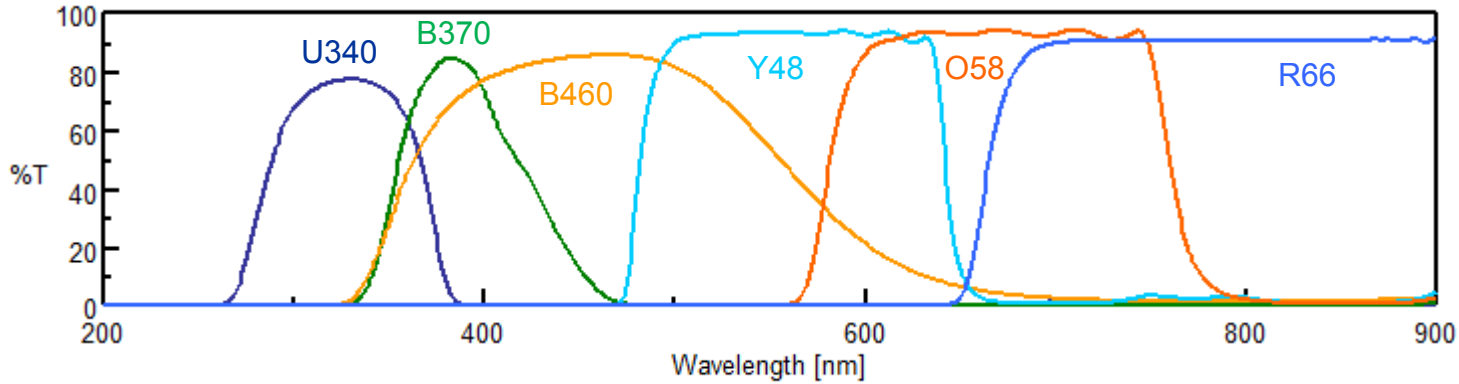


$Abs=0.2984 \cdot Conc$

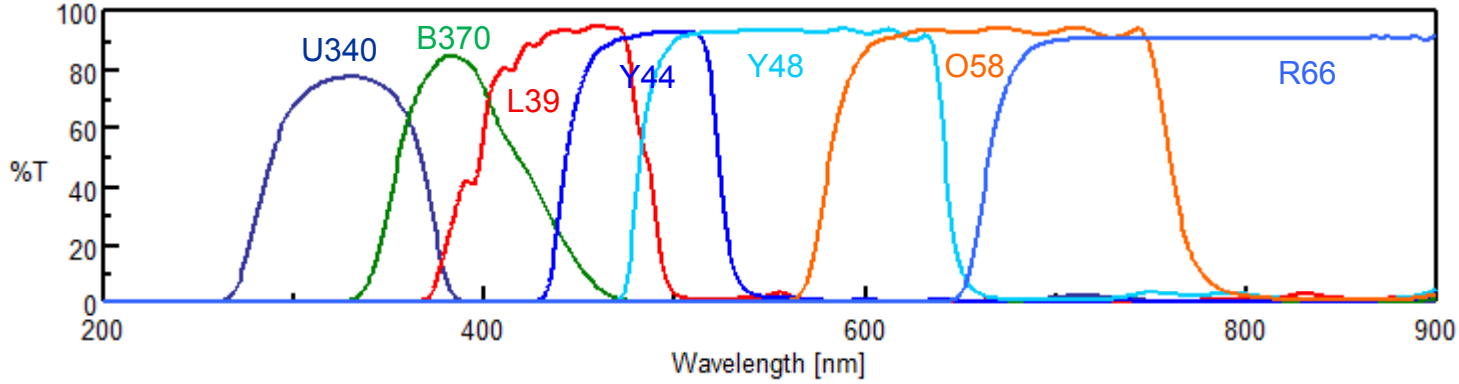
$R^2=0.9994$

(1) Optimization with High-order Diffraction Light Cut-off Filter

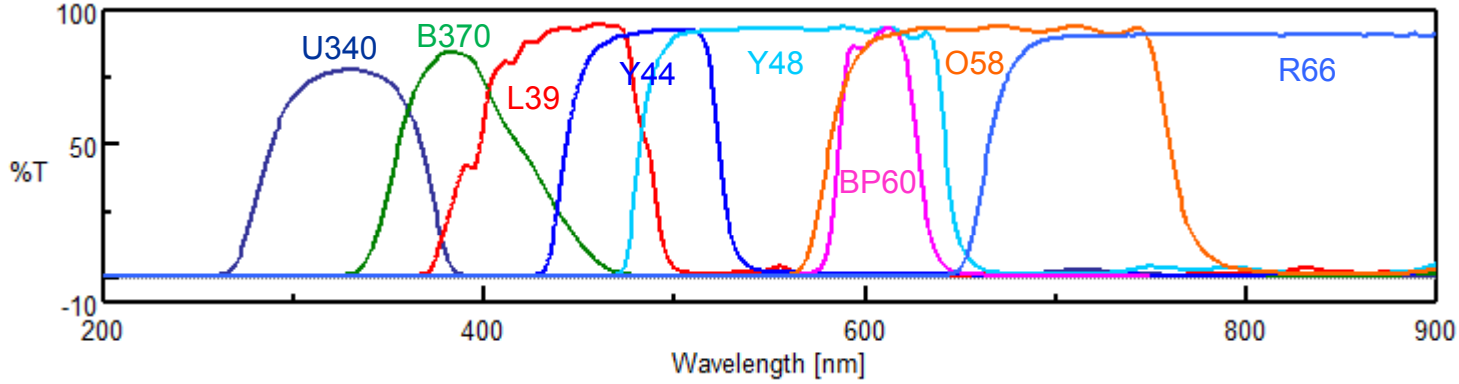
V-650/660/670



V-750/770/780

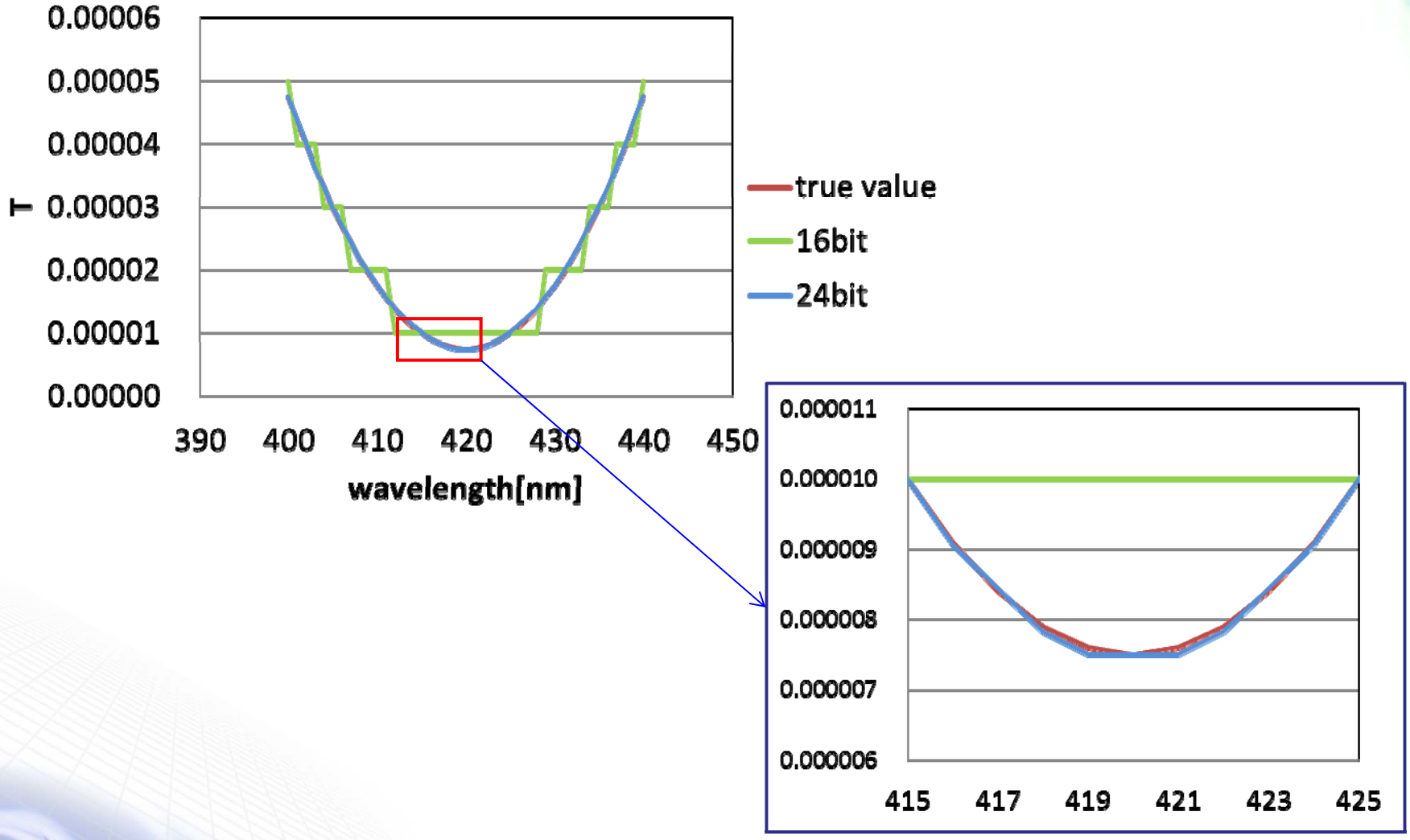


V-760

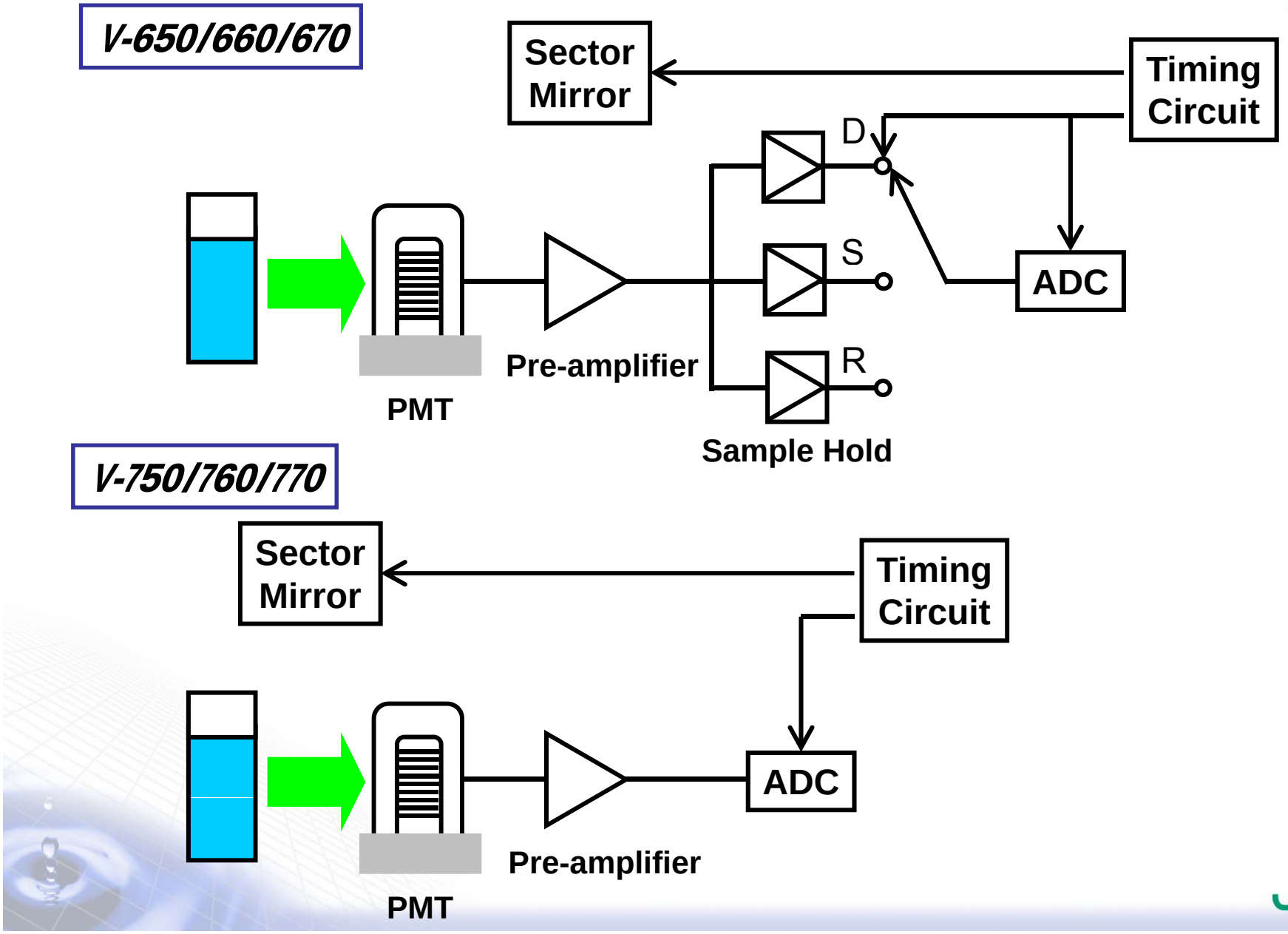


(2) Ultra-high Resolution ADC, 24 bit

V-750/760/770/780 32-times higher resolution than 18 bit in V-600



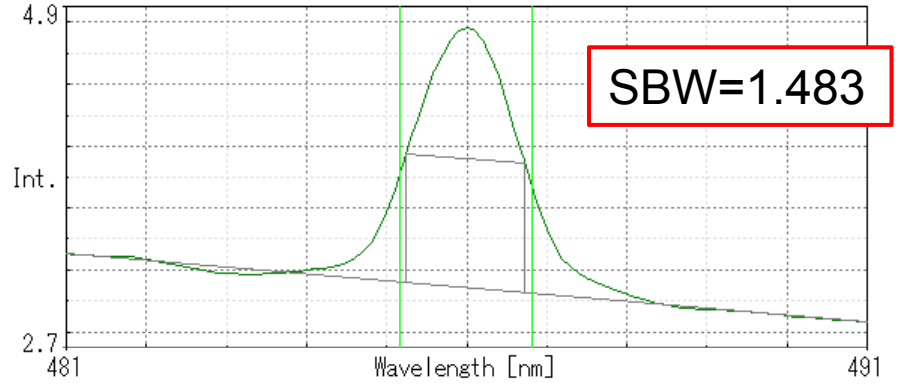
(3) Offset-free Signal acquisition in S, R, D



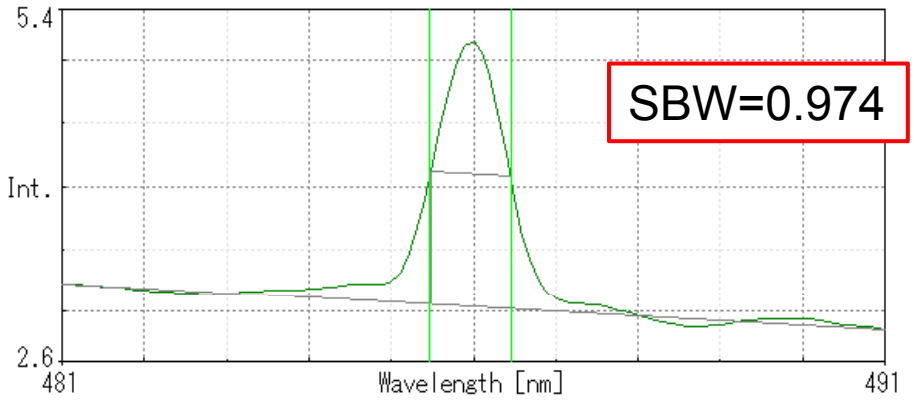
2. High resolution as 1.0 nm bandwidth

Emission line of D_2 lamp

V-630

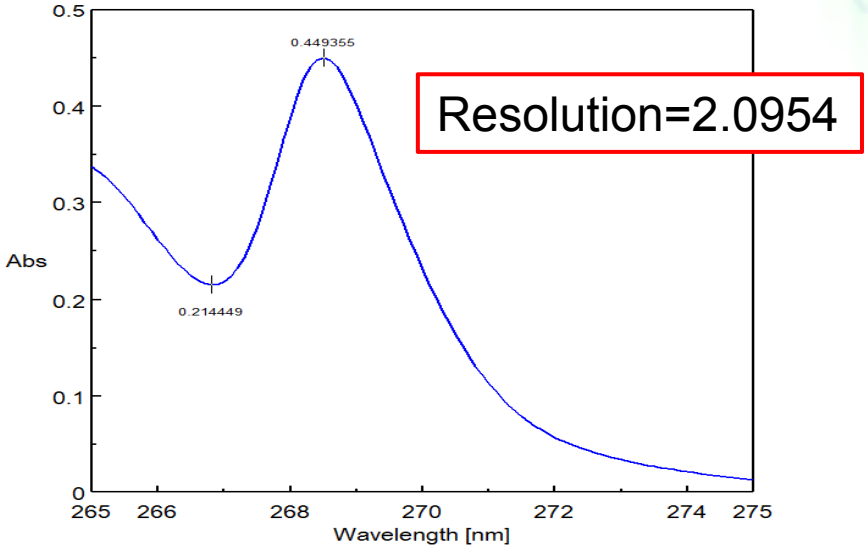


V-730

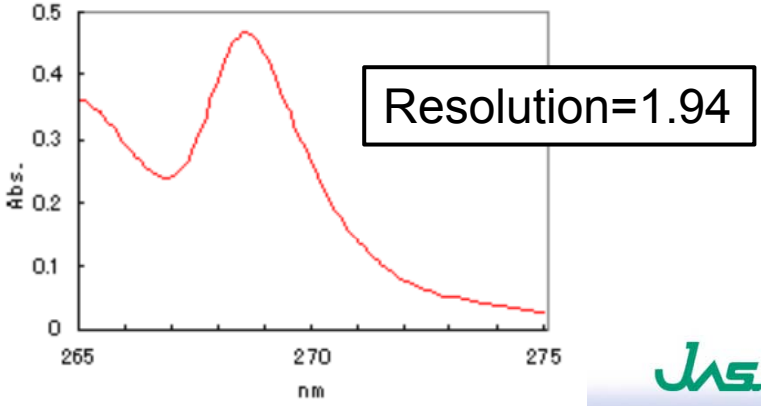


Resolution test of EP -Toluene/Hexane

V-730



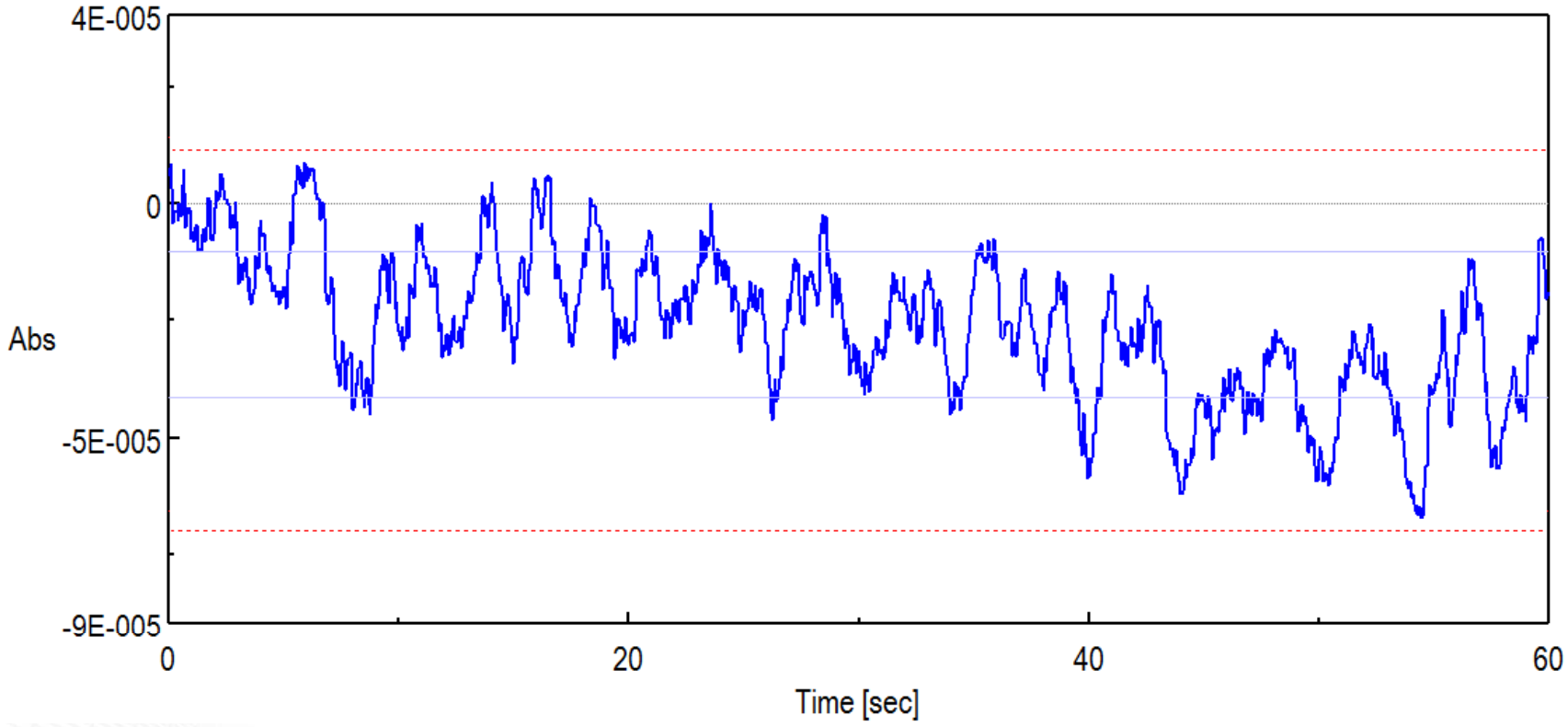
Shimazu UV-1800



Noise Level of V-730

Specification

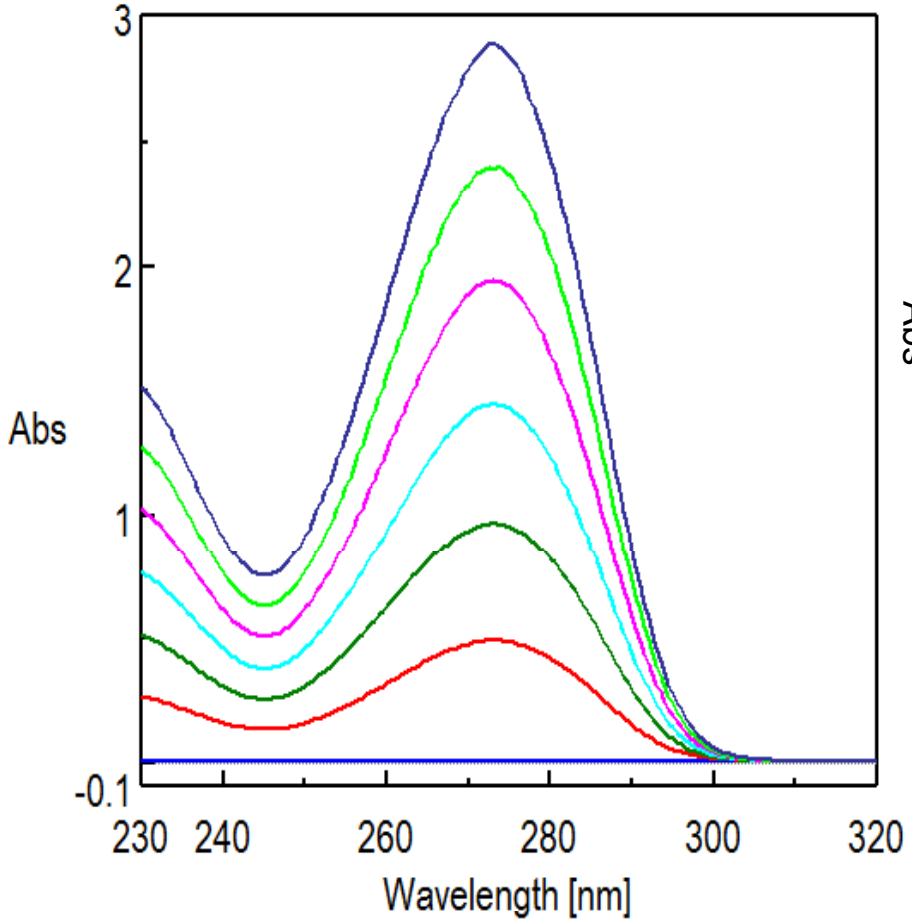
RMS Noise≦0.00004 Abs

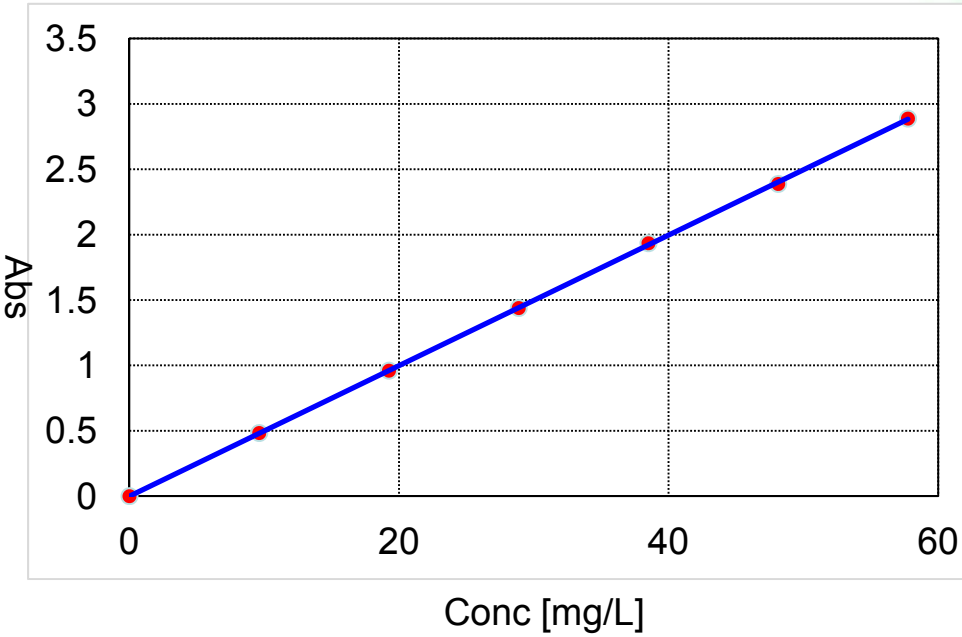


RMS Noise=0.000016 ⇒ Pass

Dynamic Range of V-730

Abs 3 with caffeine aqueous solution



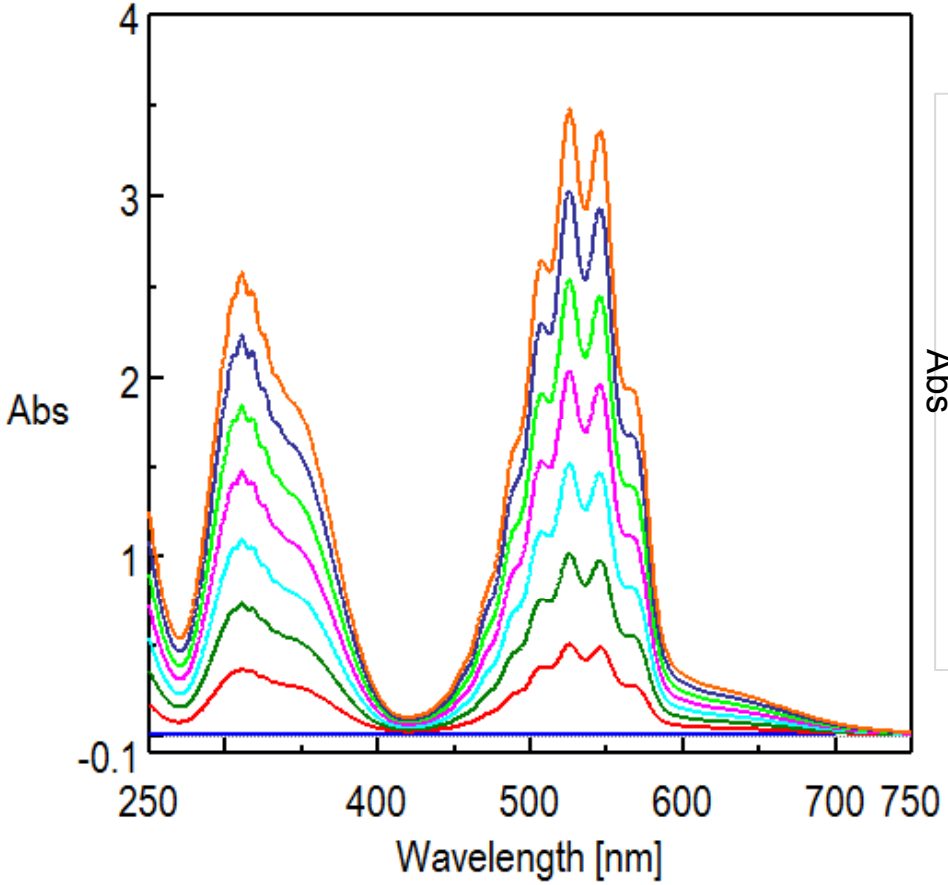


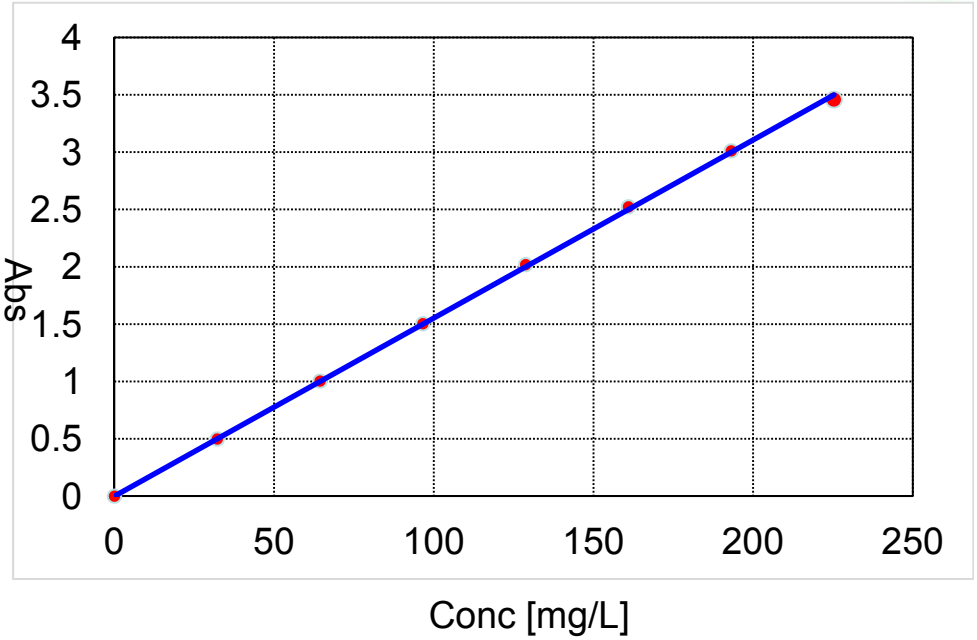
$Abs = 0.0499 \cdot Conc$

$R^2 = 0.9999$

Dynamic Range of V-730

Abs 3.5 with $KMnO_4$ aqueous solution





$Abs = 0.0155 \cdot Conc$

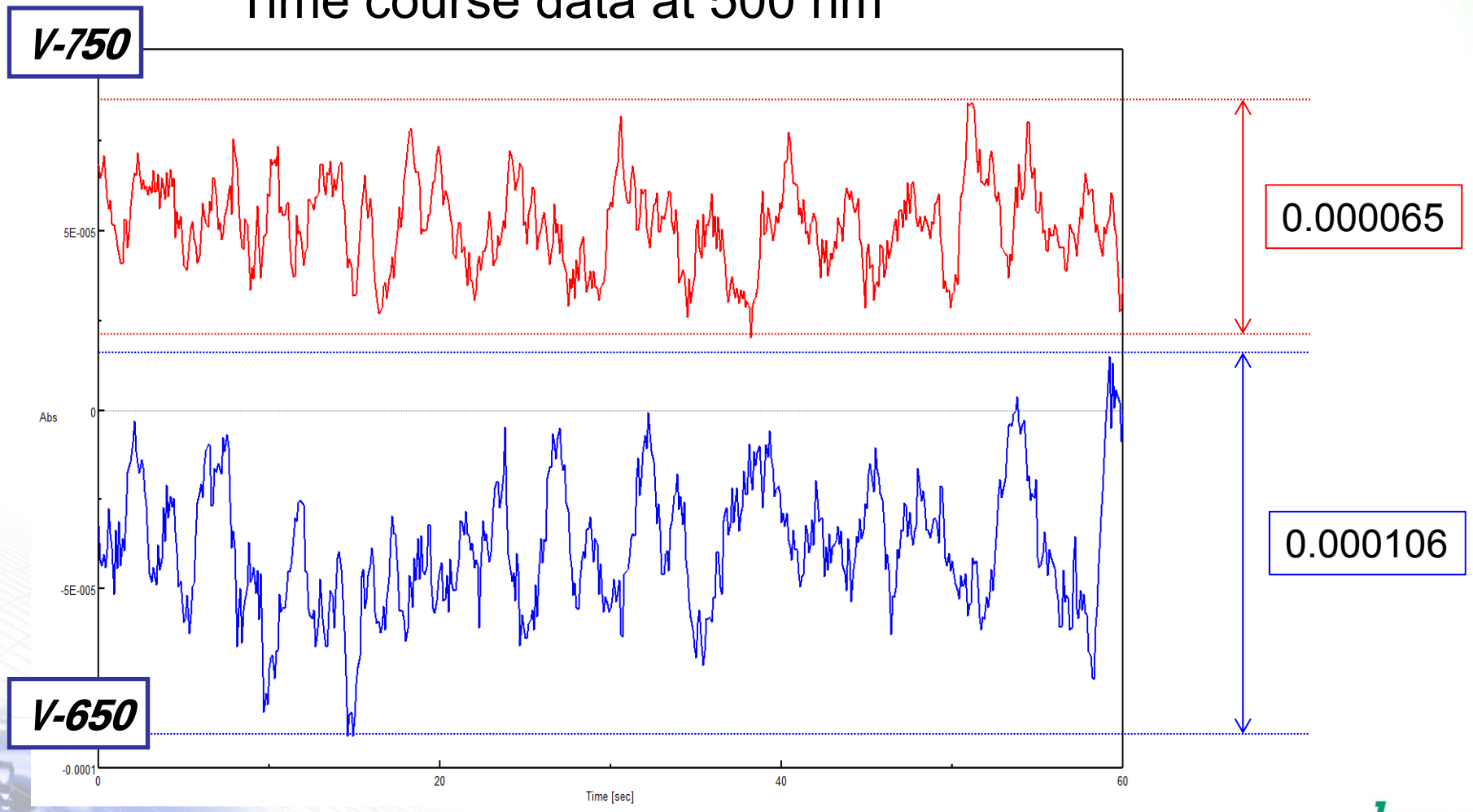
$R^2 = 0.9997$

3. High signal to noise ratio

V-730/750/760/770/780

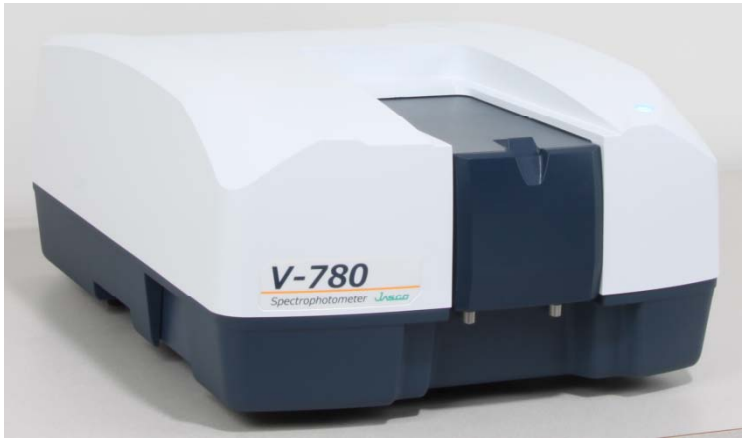
Enhanced signal-to-noise ratio by improving the light source power supply

Time course data at 500 nm



4. New model: High sensitivity in NIR

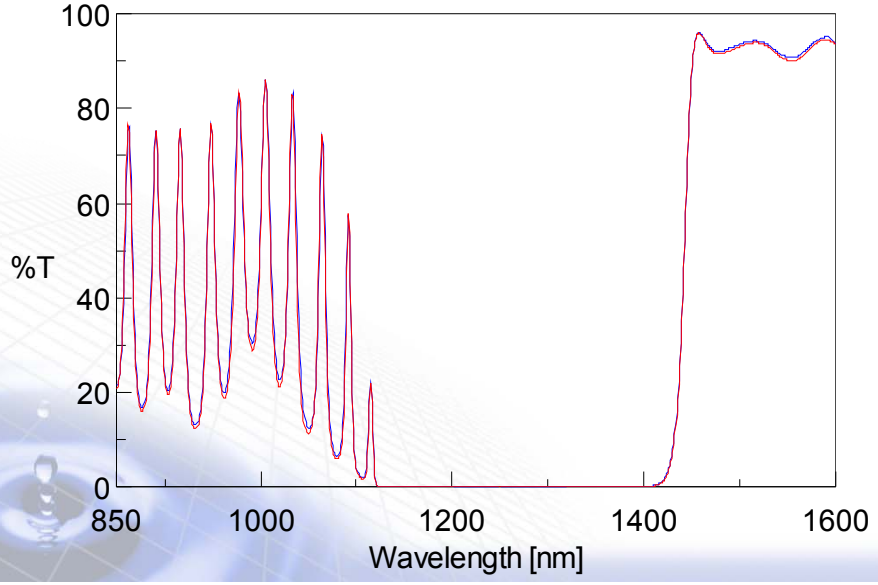
V-780

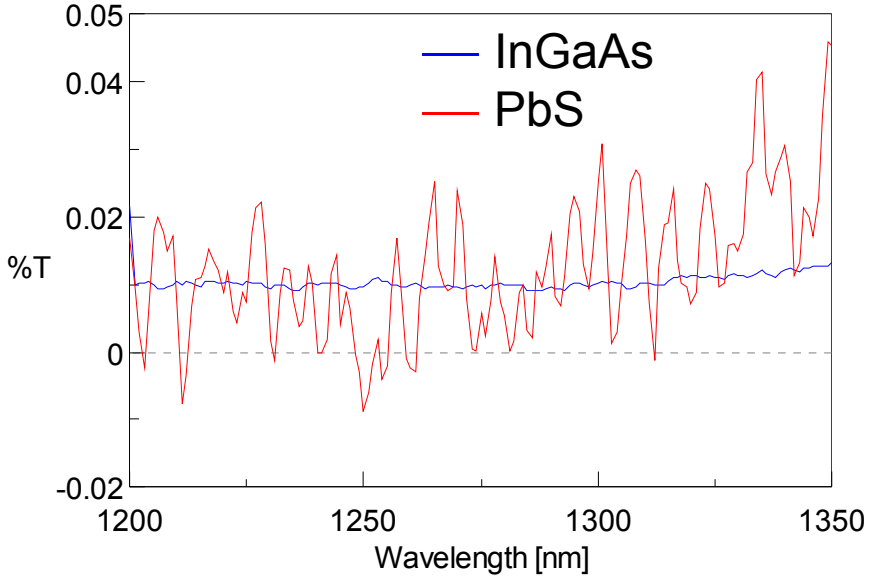


Optical System	Single monochromator, Czerny-Turner mount Double beam type
Light Sources	Deuterium lamp, Halogen lamp
Grating	UV/VIS: 1200 lines/mm plane grating NIR: 600 lines/mm plane grating
Detector	Photomultiplier tube, Peltier cooled InGaAs detector
Wavelength Range	190 to 1600 nm
Spectral Bandwidth	UV/VIS:0.1, 0.2, 0.5, 1, 2, 5, 10, L2, L5, L10, M1, M2 nm NIR:0.2, 0.4, 1, 2, 4, 10, 20, L4, L10, L20, M2, M4 nm

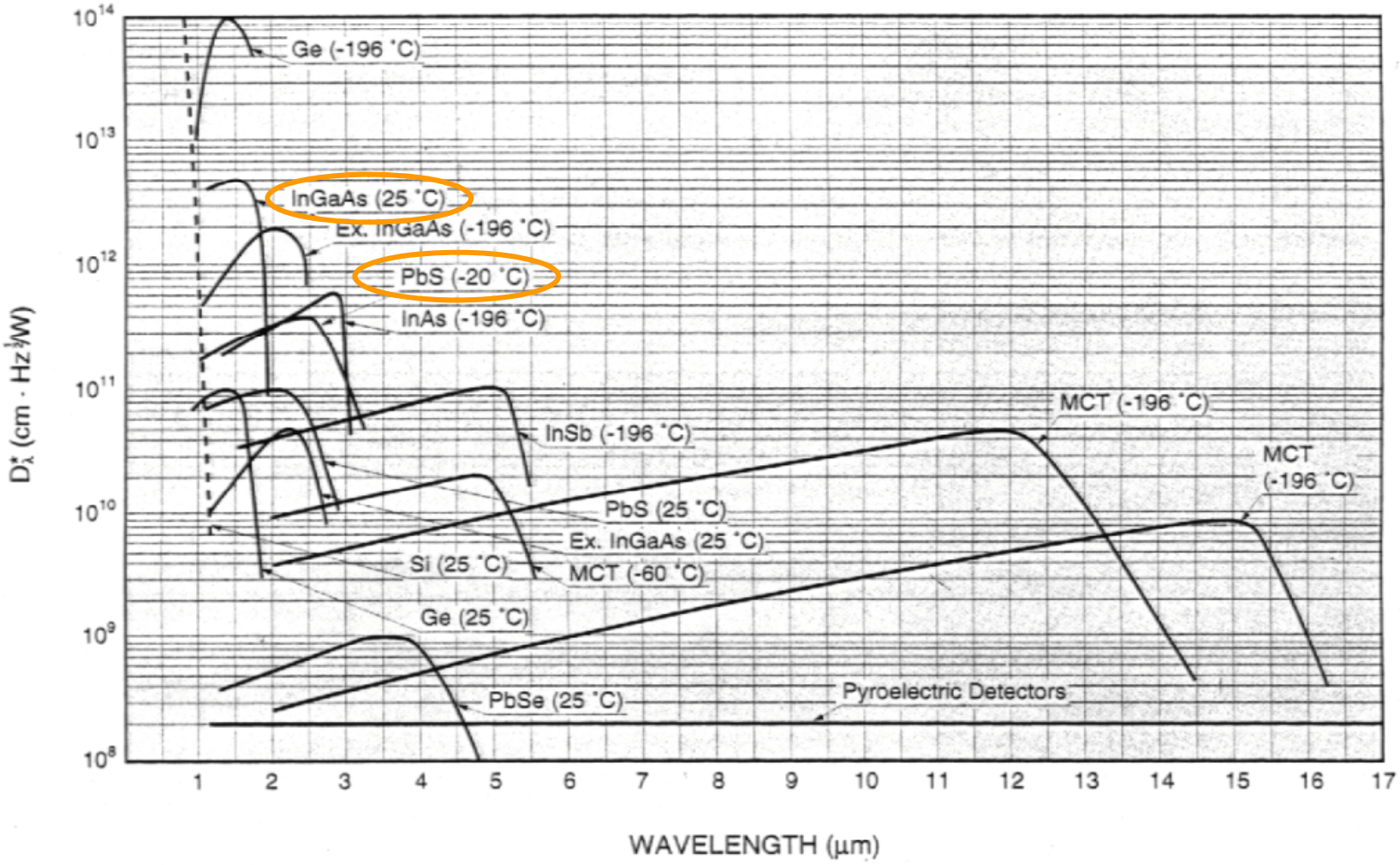
- High S/N in NIR

Cut-off filter for 1.3 μm band for optical communication





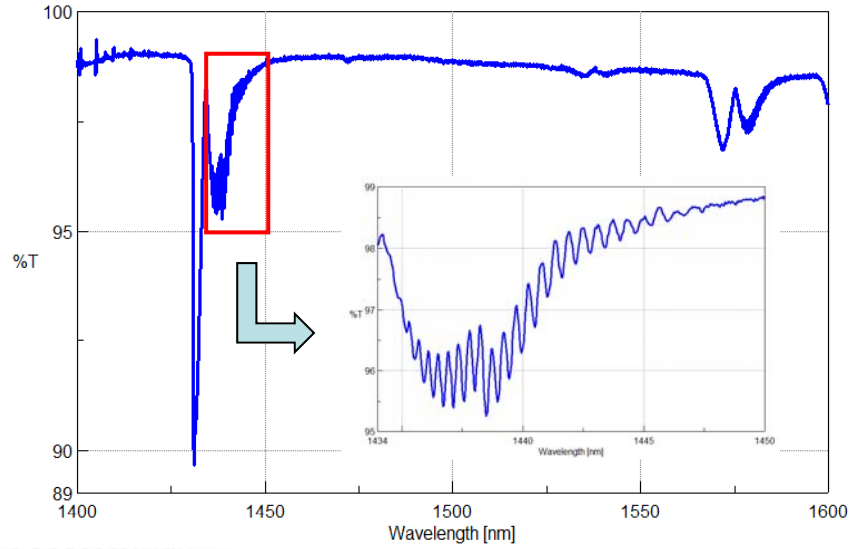
4. New model: High sensitivity in NIR



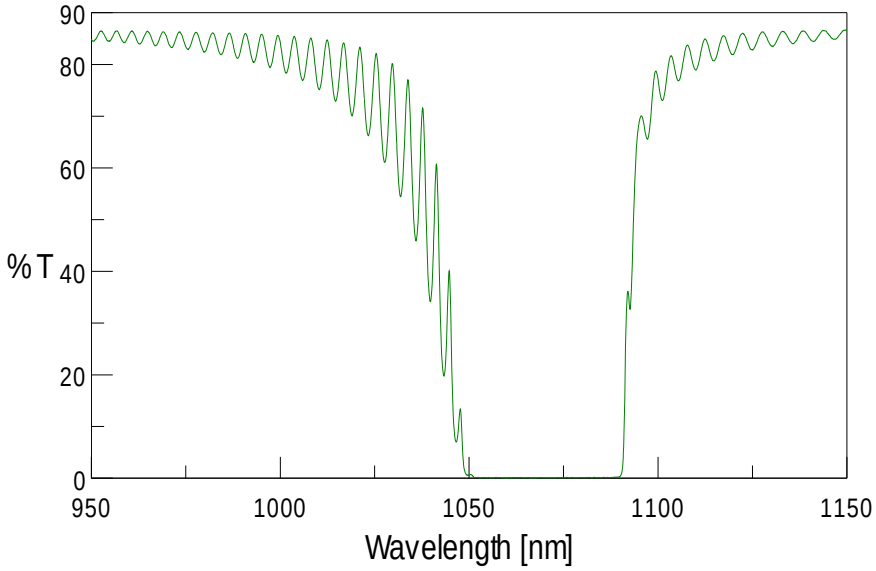
4. New model: High sensitivity in NIR

- High resolution in NIR

The vibration spectrum of CO_2



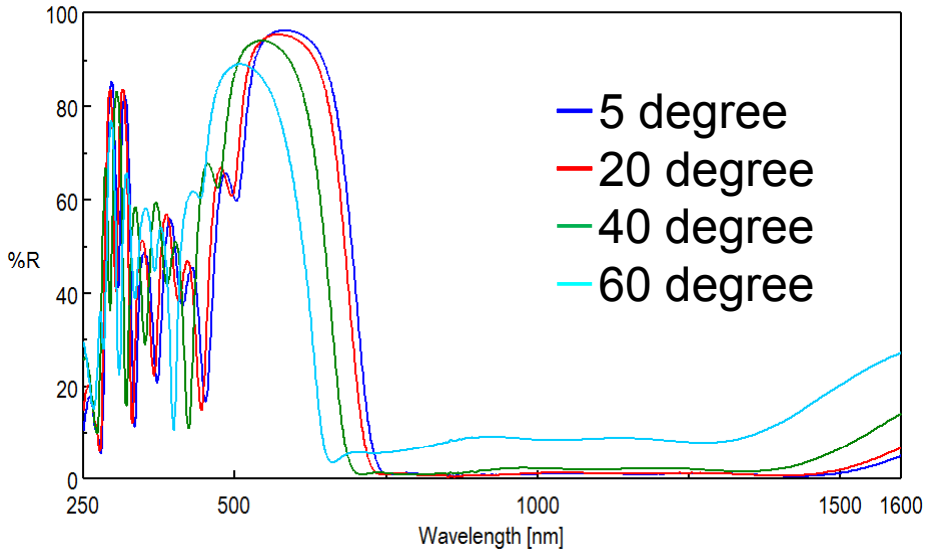
The spectrum of NIR notch filter



4. New model: High sensitivity in NIR

- New accessories
  - Integrating sphere
  - Absolute reflectance measurement unit

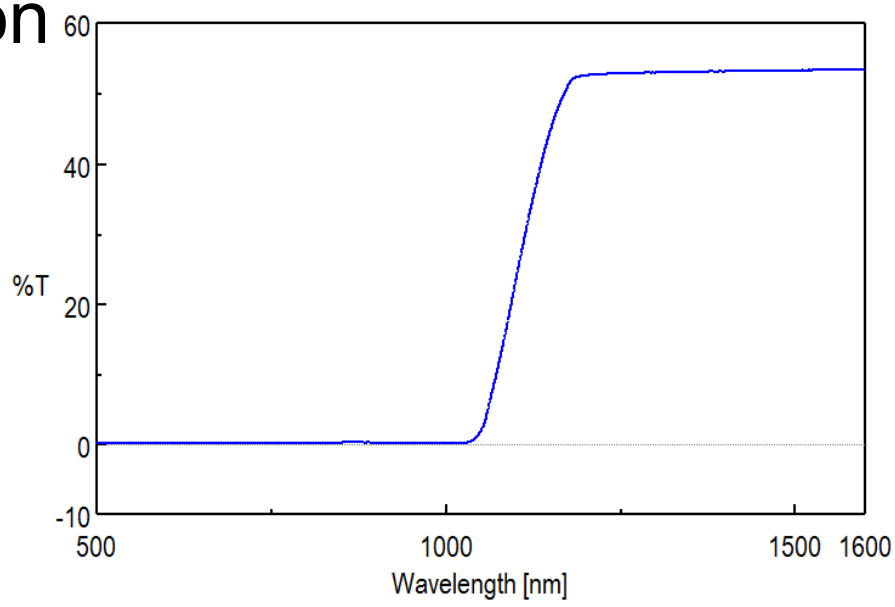
Absolute reflectance spectrum of anti-reflection coat for NIR



- A wide variety of application

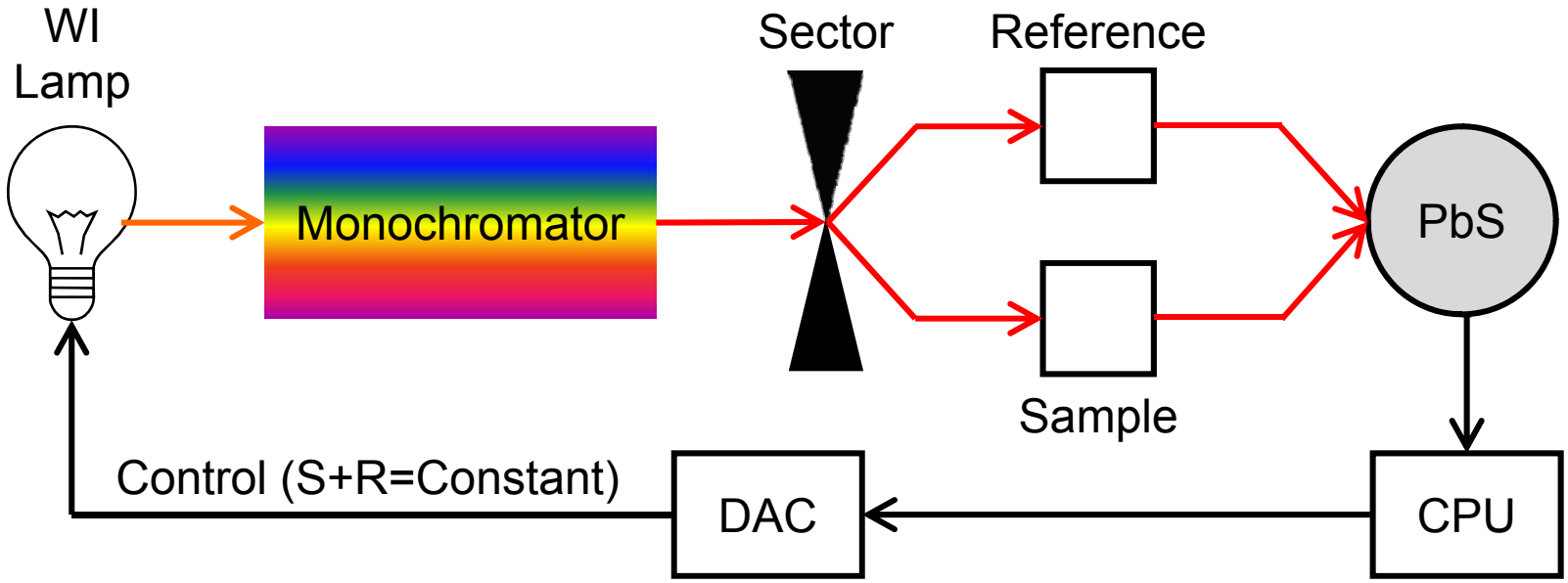
Band gap measurement of Si

Band Gap=1.13 eV



5. Wide dynamic range in NIR

V-770/780 Brightness control of light source by digital feedback



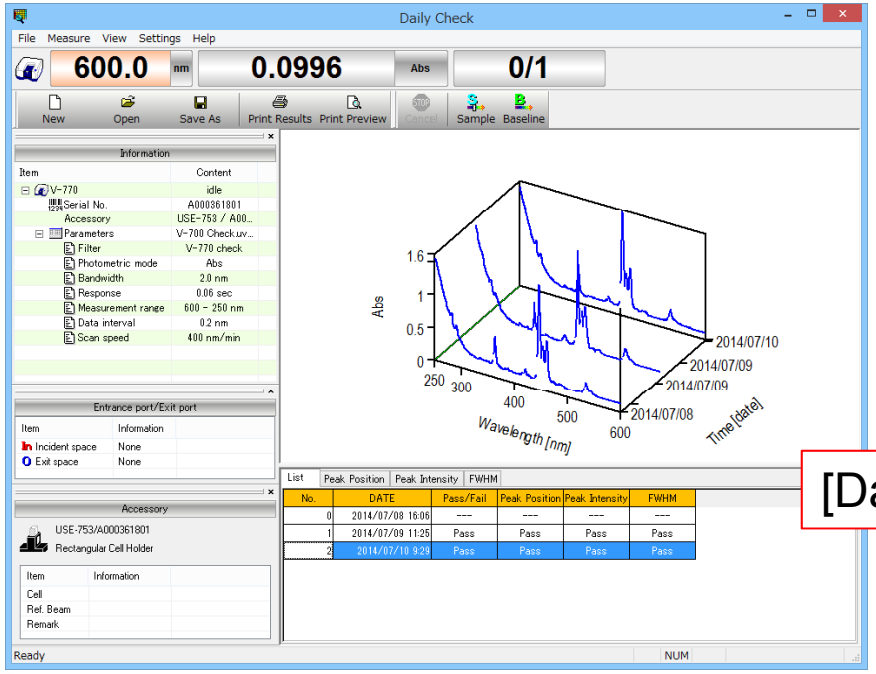
Outdated instruments (not V-600):

- The bandwidth and gain could only be adjusted for the optical signal in NIR.
- To obtain the stable optical signal intensity, the bandwidth could be changed depending on the wavelength to be used but the high resolution could not obtain in low-energy range of light sources.
- For the instrument with the fixed bandwidth, if the bandwidth is too large, the optical signal may be saturated depending on the wavelength to be used.

6. Stable Measurement Platform

V-730/750/760/770/780

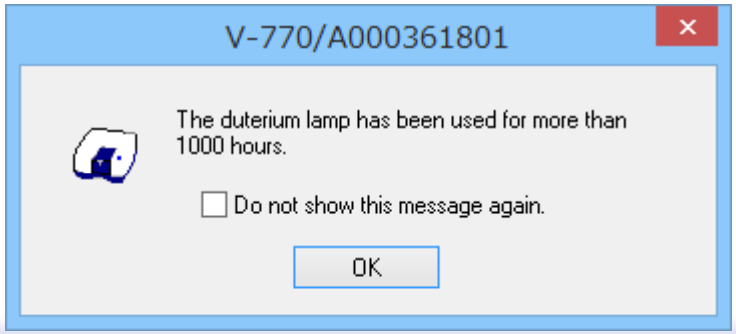
Holmium glass filter is used for checking the spectrophotometer performance everyday.



Test items:
Peak position→Wavelength accuracy
Peak intensity→Photometric accuracy
FWHM→Resolution
Spectrum comparison
→Overall spectrum profile

[Daily check] program

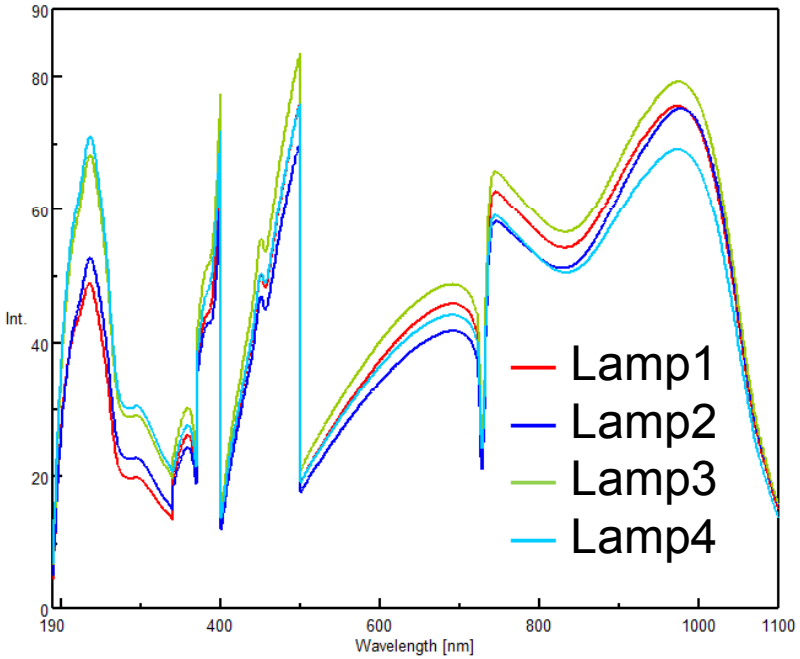
- Display of message when D_2 and WI lamps has been used for more than 1000 hours (New!)
- Validation program
- Instrument self-diagnosis function
- Display of lamp operation time



7. Alignment-free Lamp Replacement

The design of the socket deuterium lamp and socket tungsten halogen lamp facilitates light source over replacement, simplifies maintenance and reduces operation error.

Single beam spectra



Validation results

Inspection Items	1	2	3	4
Wavelength Accuracy	Pass	Pass	Pass	Pass
Photometric Accuracy	Pass	Pass	Pass	Pass
Noise Level	Pass	Pass	Pass	Pass
Baseline Flatness	Pass	Pass	Pass	Pass

8. Spectra Manager II & CFR

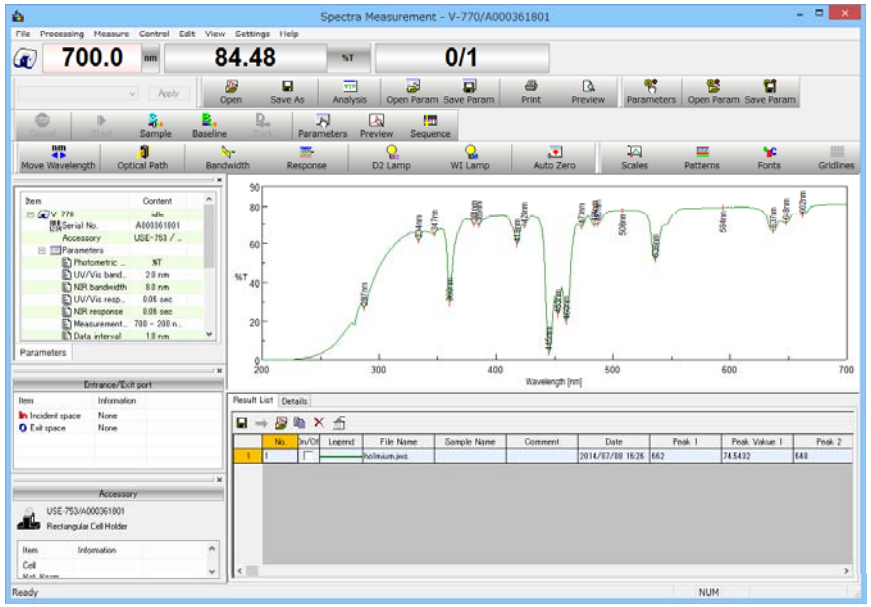
Standard Programs

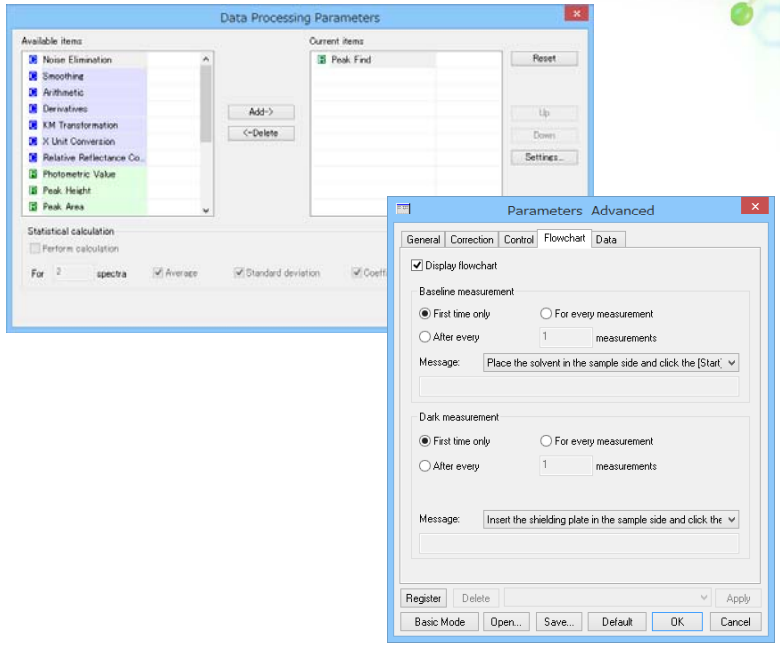
Measurement Programs
Spectra Measurement (Improved!)
Quantitative Analysis (Improved!)
Time Course Measurement
Dual-Wavelength Time Course Measurement (New!)
Parallel Time Course Measurement (Cell Changer)
Fixed Wavelength Measurement
Abs/%T Meter
Validation (Improved!)
Daily Check (New!)

Standard Programs

Analysis Programs
Spectra Analysis
JASCO Canvas
Enzymatic Reaction Rate Calculation
Film Thickness Analysis
Color Analysis (Compatible with international standards!)
X-Unit Conversion Photon
Time-Axis Offset
Peak Normalization
UV/Vis Kramers-Kronig Transform
Channel Conversion
Data Dump
Data Accumulation
Arithmetic between Channels
Arithmetic between Data

Spectra Measurement





●Data processing functions

Correction: Noise elimination, smoothing, arithmetic operations, derivatives, KM transform, x-axis conversion, relative reflectance correction
Result display: Photometric value, peak detection, peak area, FWHM, spectrum comparison, quick quantitation, film thickness calculation

●Statistical calculations

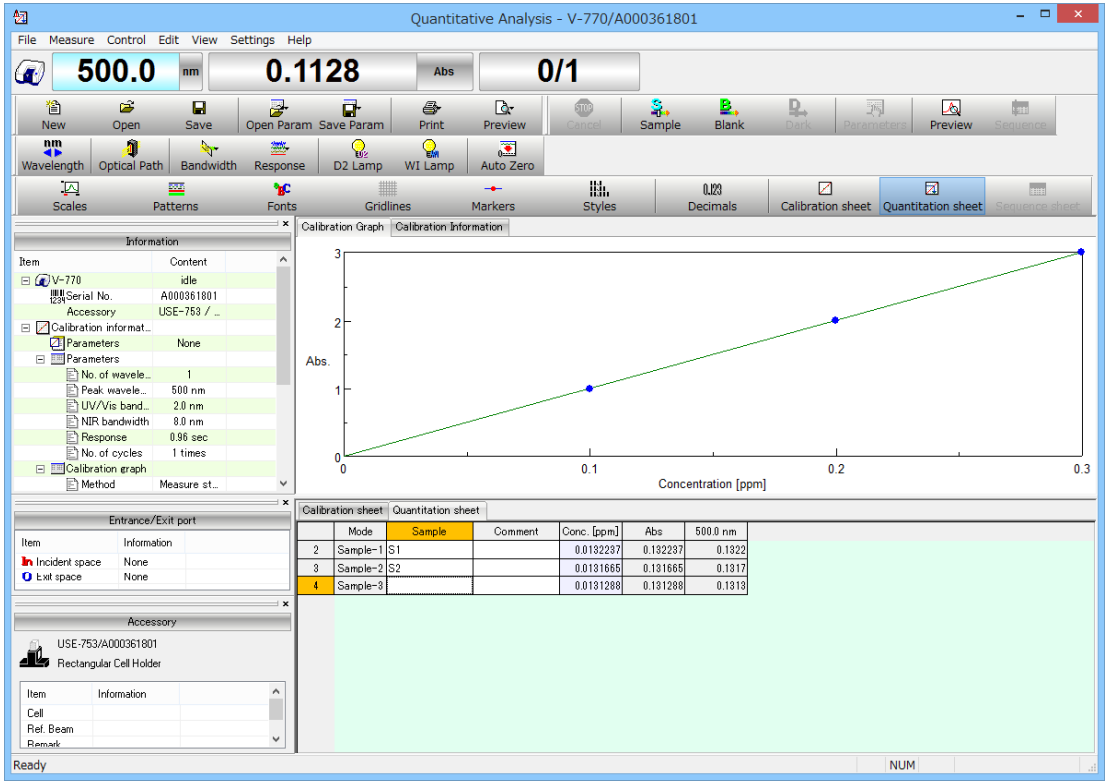
Statistical calculations (average, standard deviation, coefficient of variation) can also be performed for a specified number of measurements.

●Sequential measurements

●Flowchart measurement

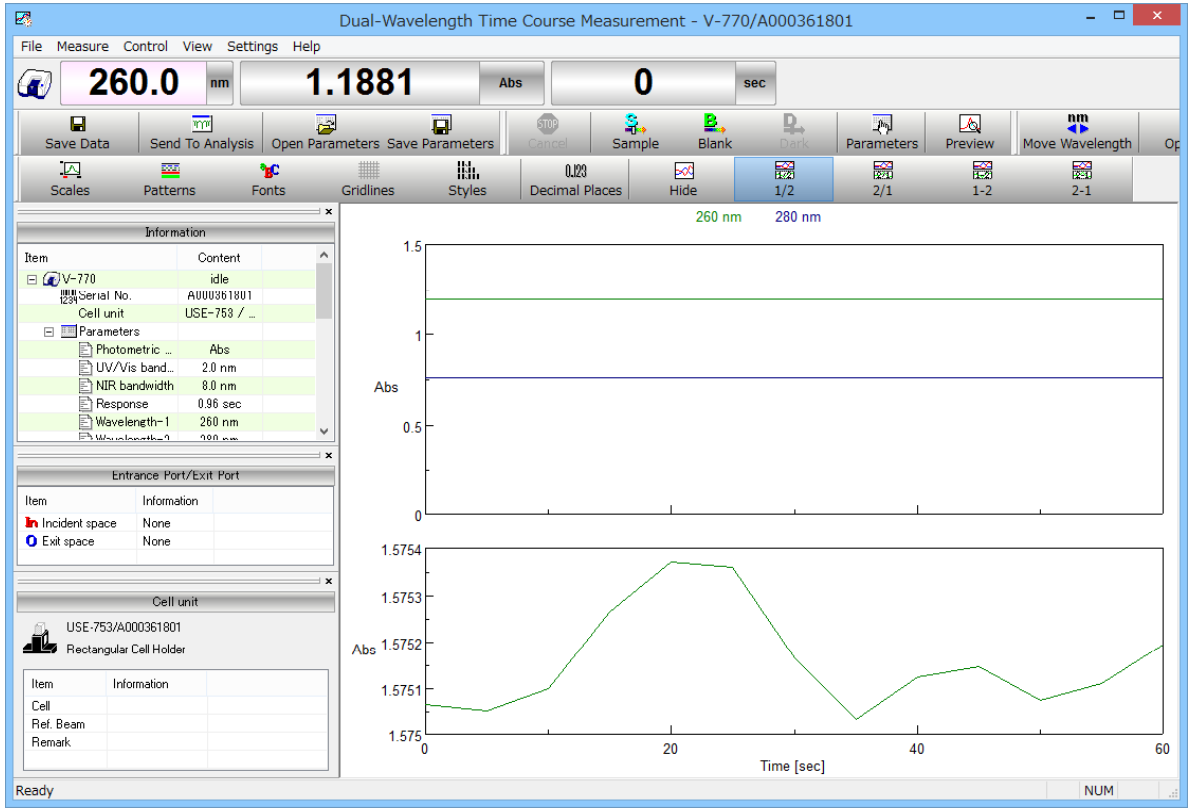
●Autosampler available

Quantitative Analysis



- Quantitative analysis (from creating the calibration curve to performing the quantitative analyses) can be performed using one program package
- Sequential measurements
- Autosampler available

Dual-Wavelength Time Course Measurement

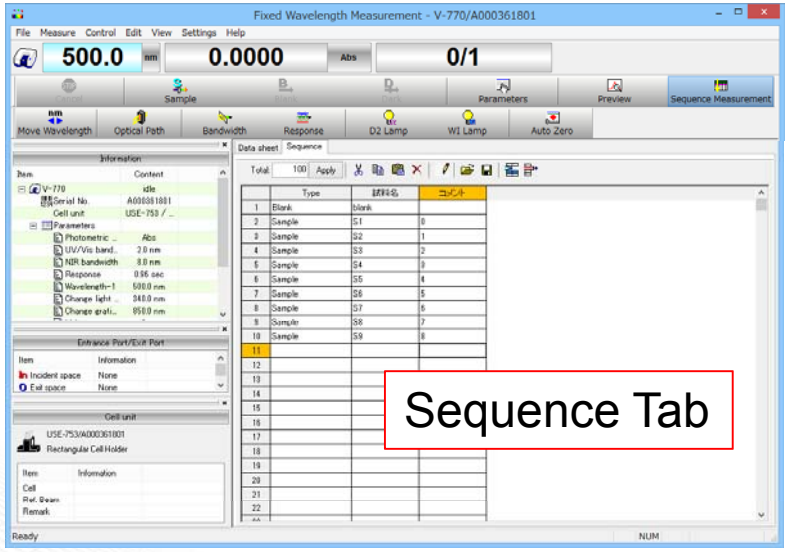


- Kinetics measurement can be performed by dual wavelength.
- The difference between dual photometric value and the ratio of dual photometric value can be plotted.

Expanded Functions

●Sequential measurements

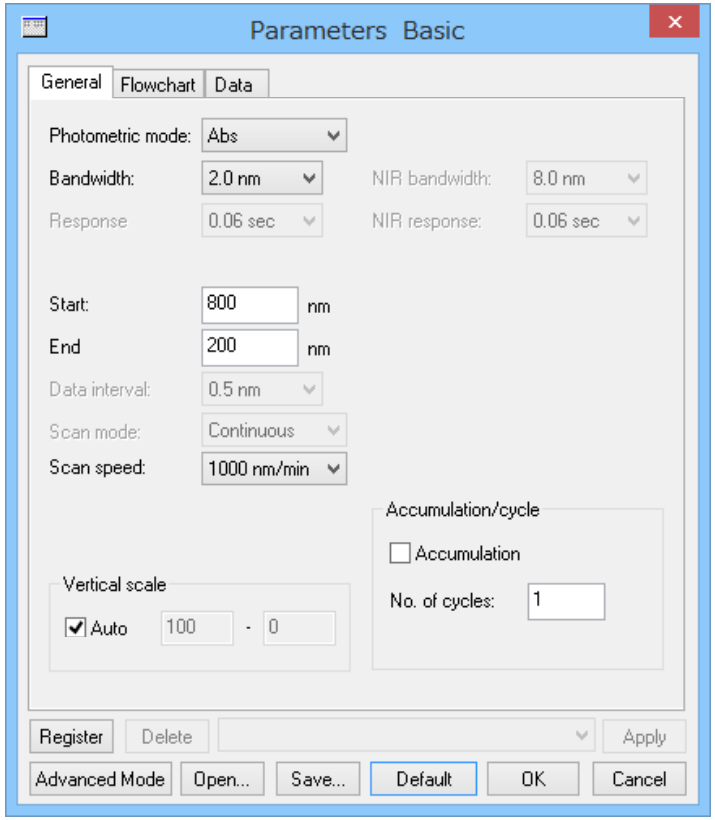
Measurements can be performed using a sequence sheet in which measurement types, sample names and comments are specified. The sequence sheet can be saved and utilized again.



Programs

- Spectra Measurement
- Quantitative Analysis
- Fixed Wavelength Measurement

● Enhanced Basic mode



The response time is automatically determined depending on the selected bandwidth and scan speed so that the spectrum profile does not become broad.
The data interval is also automatically determined depending on the selected bandwidth.

Optional Programs

Programs for Biochemical Applications
Protein Nucleic Acid Measurement (Improved!)
Kinetics Analysis
Temperature Control Measurement (Improved!)

Programs for Quantitation
Spectrum Quantitative Measurement (New!)
Spectrum Quantitation
CLS Quantitative Measurement
PCR Quantitative Measurement
PLS Quantitative Measurement
PCA
Chromaticity/Turbidity Measurement (Compatible with international standards!)

Optional Programs

Programs for Versatile Applications
Interval Scan Measurement
Temperature Interval Measurement
Macro Command

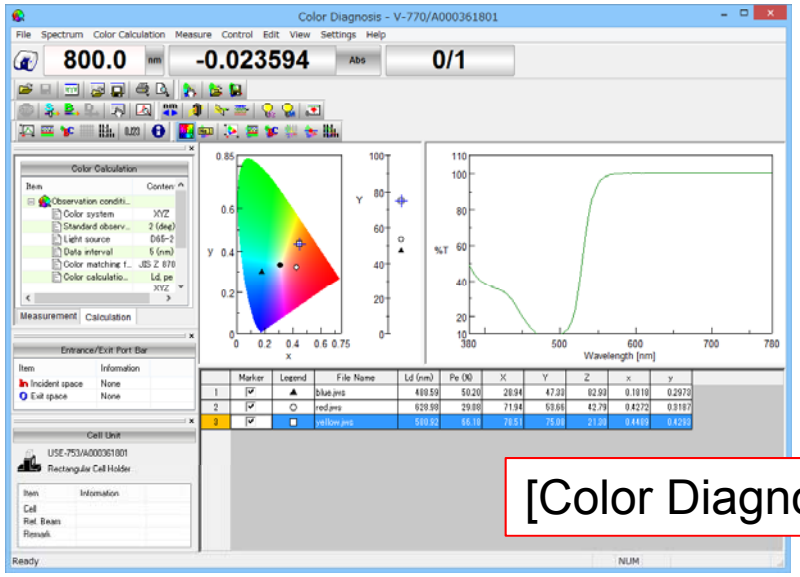
Program Name for Color Analysis
Color Diagnosis (Compatible with international standards!)
Color Matching
Color Matching for Color Materials
Luminous Color Measurement
ASTM Color Analysis
Saybolt Color Analysis

Optional Programs

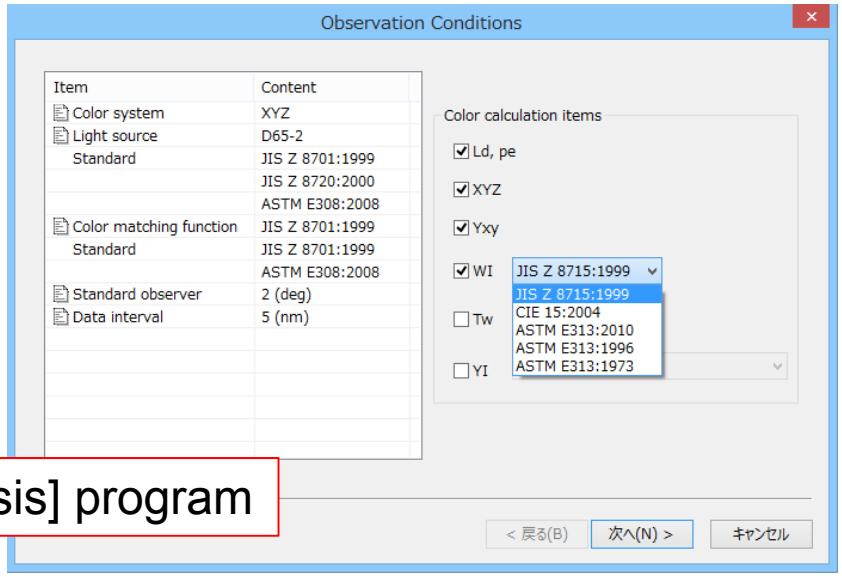
Programs for Material Analysis
Solar Transmittance/Reflectance Calculation (Compatible with international standards!)
Solar Transmittance/Reflectance Measurement (Compatible with international standards!)
Sample Haze Calculation (Compatible with international standards!)
UPF Calculation (Compatible with international standards!)
UPF Measurement (Compatible with international standards!)
Absolute Reflectance Spectra Measurement
Absolute Reflectance with Variable Incident Angle Measurement
Phase Difference Spectra Measurement
Multi-Layer Film Thickness Analysis
UV Shield Factor Calculation
Band Gap Calculation
Film Thickness and Refractive Index
Average Reflectance Calculation

Optional Programs

- Compatible with International Standards



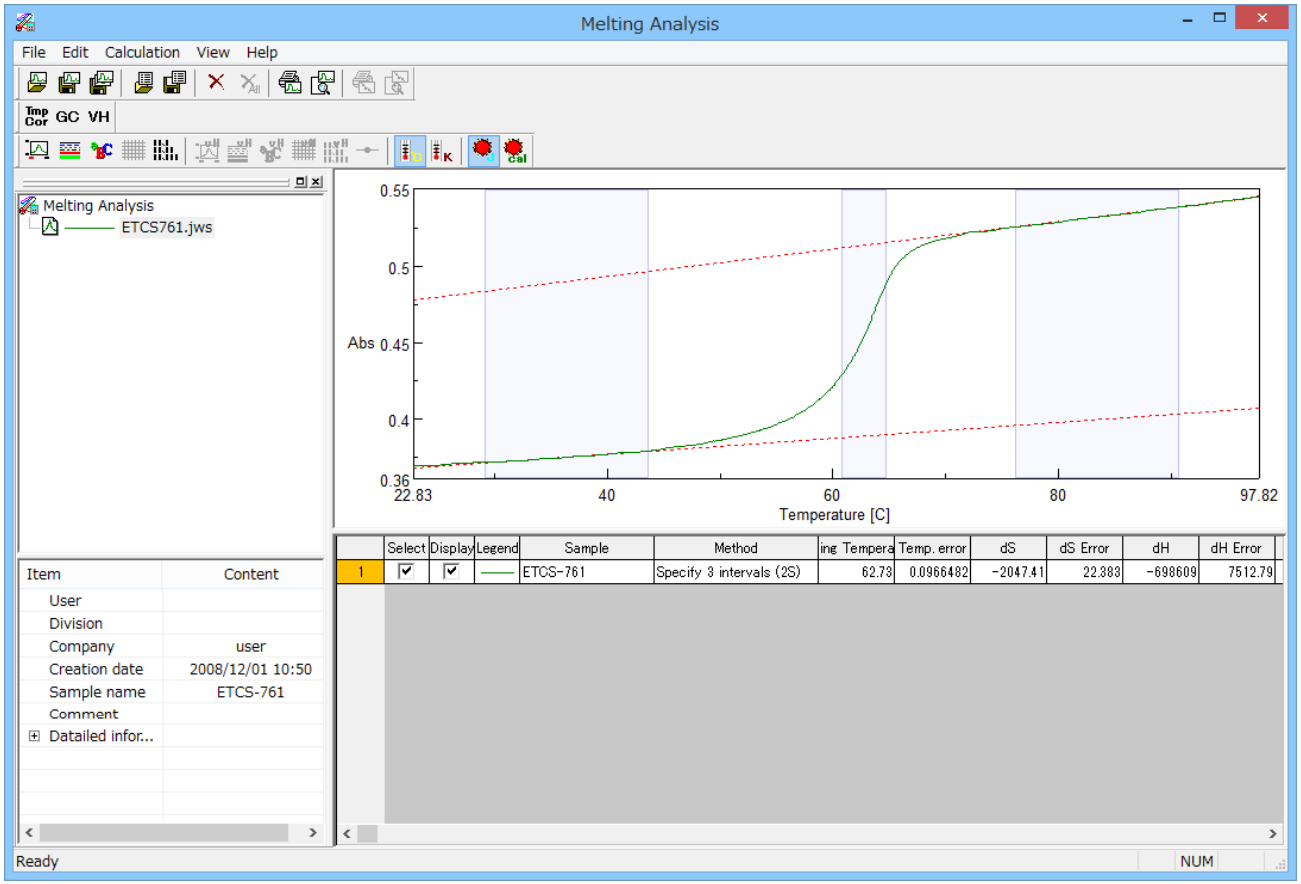
[Color Diagnosis] program



Programs

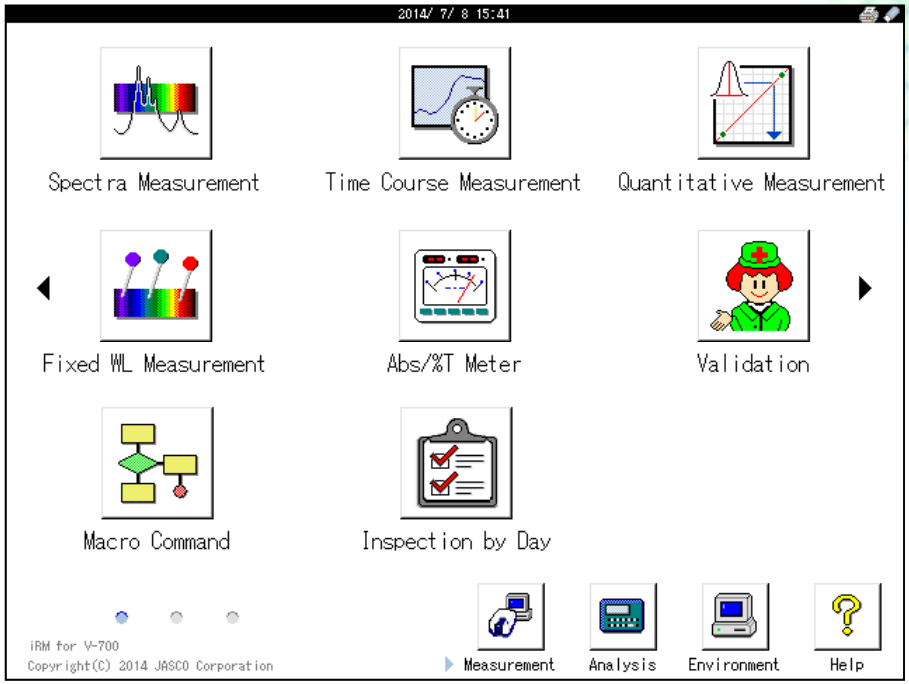
- Color Analysis
- Chromaticity/Turbidity Measurement
- Color Diagnosis
- Solar Transmittance/Reflectance Calculation
- Solar Transmittance/Reflectance Measurement
- Sample Haze Calculation
- UPF Calculation
- UPF Measurement

Enhanced DNA Melting Analysis Program



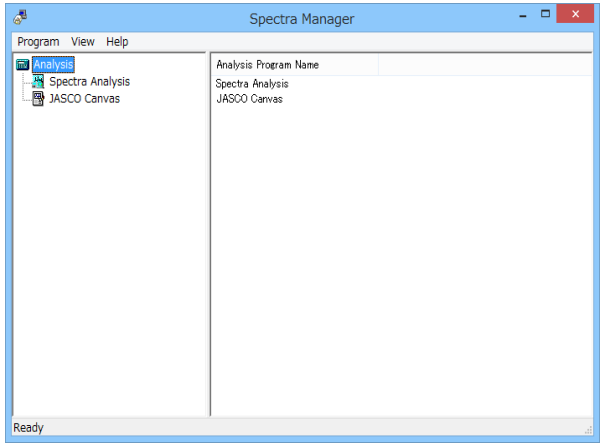
- Not just Tm and ΔH, ΔS can be calculated
- Fitting method or van't Hoff plot method can be selected

9. iRM-1000



- USB memory available
- Analysis programs for DS type are installed as default
- Enriched standard programs
- Increased applicable printers

iRM data can be moved to Spectra Manager using USB flash drive

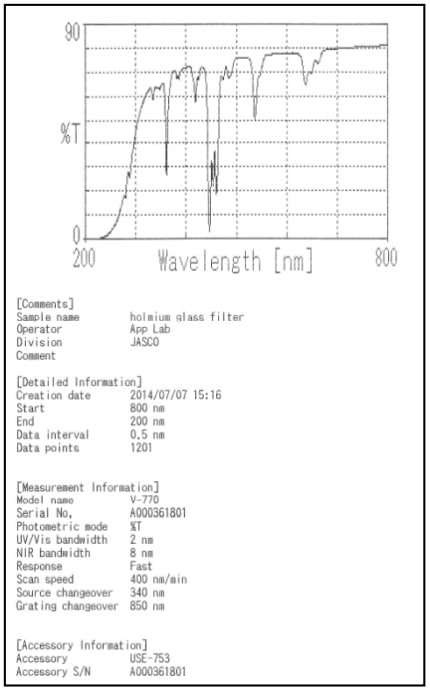


Analysis programs for PC type are as standard

Increased Applicable Printers

- Thermal printer in wide width, enabling the print of spectrum
- Non-thermal type of compact printer

Print image of Printy4



- Support of color printing by ESC/P-R

EPSON Printer
(compatible with ESC/P-R)

Standard Programs

Measurement Programs
Spectra Measurement
Quantitative Measurement
Time Course Measurement
Fixed Wavelength Measurement
Macro Command
Abs/%T Meter
Validation program
Daily Check (New!)

Analysis Programs
Spectra Analysis
Enzymatic Reaction Rate Calculation
Film Thickness Analysis
Color Analysis program

Optional Program

Name	Components
Bio Package	Protein Nucleic Acid Measurement (Improved!)
	Parallel Time Course Measurement (Cell Changer)
	Kinetics Analysis
	Temperature Control Measurement
	DNA Melting Analysis

10. Updated Accessories

Compatible with V-500/600 series accessories

Model No.	Name
NQF-781	Vacuum Sipper
NPF-782	Peristaltic Sipper
NQF-783	Vacuum Sipper with Long-Path Cell
ISV-922/ISN-923/ISN-901i	60-mmϕ Integrating Sphere
ILV-924/ILN-925/ILN-902i	150-mmϕ Integrating Sphere
PIN-903i	Horizontal Sampling Integrating Sphere
ARV-913/ARN-914/ARN-915i	Absolute Reflectance Measurement Unit (synchronous)
ARSV-916/ARSN-917/ARSN-918i	Absolute Reflectance Measurement Unit (asynchronous)
ARMV-919/ARMN-920/ARMN-921i	Automated Absolute Reflectance Measurement Unit
SLM-907	Specular Reflection Unit
SLM-908	Specular Reflection Unit (accommodating 6-inch silicon wafers)

10. Upgraded Accessories

NQF-781 Vacuum Sipper

Space-saving

ISV-922/ISN-923/ISN-901i
60-mmϕ Integrating Sphere

Absolute Reflectance Measurement Unit

USB communication
Improved sample compartment lid

Improved sample holder

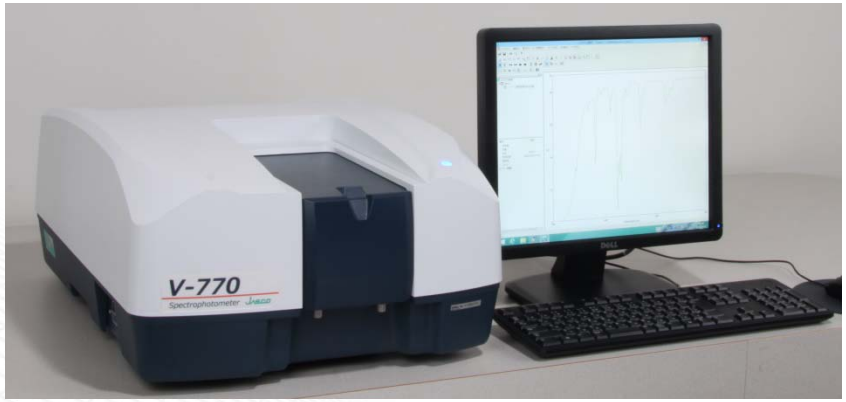
Conclusion

V-730

- Class-leading specification

V-730BIO

- Quite satisfactory function of Bio market



V-750/760/770

- Wavelength-independent dynamic range

V-780 New!

- Highly sensitive measurement in NIR