

# Application News

## No.A442

### Spectrophotometric Analysis

### Transmittance Measurement of IR-Cut Glass Using a UV-2600 UV-VIS Spectrophotometer with ISR-2600Plus Integrating Sphere

With the evolution of mankind and the accompanying development of technology, energy consumption has steadily increased. However, because energy sources such as oil and natural gas are limited, a variety of innovations have been introduced with the aim of reducing energy consumption. One of these is IR-cut glass, which effectively limits the rise of indoor temperature by filtering out near-infrared rays. On the

other hand, while cutting near-infrared radiation is an effective means of conserving energy, it is also important to ensure that visible light is effectively transmitted to the interior to permit outside light to help illuminate the interior of a room. Here we introduce use of the auto point pick feature newly added to the standard software to verify the effectiveness of IR-cut processing in window glass.

#### ■ Analytical Conditions and Results

Shimadzu's UV-2600 ultraviolet-visible spectrophotometer together with the ISR-2600Plus integrating sphere allows measurement over the entire wavelength range from 220-1400 nm. Here we conducted measurement of 3 types of glass, one type of transparent glass and two types (A, B) of IR-cut glass. Fig. 1 shows an external view of the UV-2600 with the ISR-2600Plus mounted inside. Transmittance measurement was conducted with the sample mounted in the position indicated by the arrow in Fig. 1. The measurement conditions are shown in Table 1, and the transmittance spectra of the glass samples are shown in Fig. 2. In addition, the transmittance was checked by selecting wavelengths in the ultraviolet region (300 nm), the visible region (550 nm), and near-infrared region (1350 nm), respectively. Table 2 shows the transmittance at each of the wavelengths.

From Fig. 2, it is clear that in contrast to the high transmittance exhibited by the transparent glass in the visible to near-infrared region, the IR-cut glass A and B samples exhibited transmittance that was reduced to less than 50 % in the near-infrared region. Moreover, compared to the IR-cut glass A, the IR-cut glass B exhibited lower transmittance in the near-infrared region but higher transmittance in the visible region, indicating that while acting to suppress the rise in temperature inside the room, IR-cut glass B simultaneously permitted external light to enter the room.

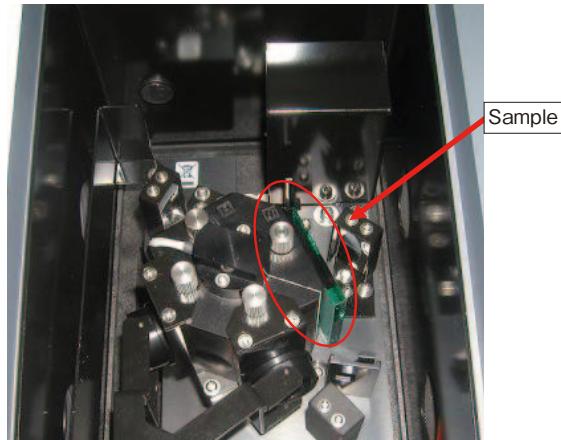


Fig. 1 UV-2600 with the ISR-2600Plus Mounted

Table 1 Analytical Conditions

Instrument	: Shimadzu UV-2600 ultraviolet-visible spectrophotometer ISR-2600Plus integrating sphere
Measurement Wavelength Range	: 220-1400 nm
Scan Speed	: Medium
Sampling Pitch	: 1.0 nm
Photometric Value	: Transmittance
Slit	: 5 nm
Detector Switching Wavelength	: 830 nm
Lamp Switching Wavelength	: 323 nm

Table 2 Analytical Results

	300 nm	550 nm	1350 nm
Transparent glass	0.02 %	89.22 %	76.68 %
IR-cut glass A	0.01 %	46.97 %	41.90 %
IR-cut glass B	0.02 %	77.64 %	27.74 %

### ■ Auto Point Pick Feature

When the auto point pick feature is used, the photometric value at the specified wavelength is automatically displayed simultaneously with the completion of measurement. This feature is convenient for verification of the photometric value when the same wavelength is to be used for each measurement, eliminating the need to repeatedly set and verify the value.

The auto point pick setting is easily conducted while setting the other analytical conditions. Just select the [Data Process] checkbox, and select [Point Pick], as shown in Fig. 3. By registering the point in a template file beforehand using the [Template] setting, and then loading that file prior to measurement, the photometric value at the specified wavelength is automatically displayed simultaneously with the completion of measurement.

An example of the settings for automatic implementation of point picking is shown in Fig. 4.

### ■ Other Convenient Auto Data Processing Functions

In addition to the point pick feature introduced here, there are various other convenient functions provided in the data processing part of the UVProbe software. Some of these include peak detection in which peaks are detected automatically, smoothing and data arithmetic operations included in data operations (smoothing, integration, arithmetic operations, etc.), in addition to area calculation for a specified range in area calculation, etc. Utilizing these features permits the data processing results to be obtained simultaneously with the completion of measurement.

### ■ Conclusion

Measurement results over a wide spectral range from the ultraviolet to near-infrared region can be obtained using the Shimadzu UV-2600 ultraviolet-visible spectrophotometer together with the ISR-2600Plus integrating sphere. In addition, utilizing the wide variety of data processing functions that are included in the UVProbe software makes it extremely convenient to check the processed data as soon as the measurement is completed.

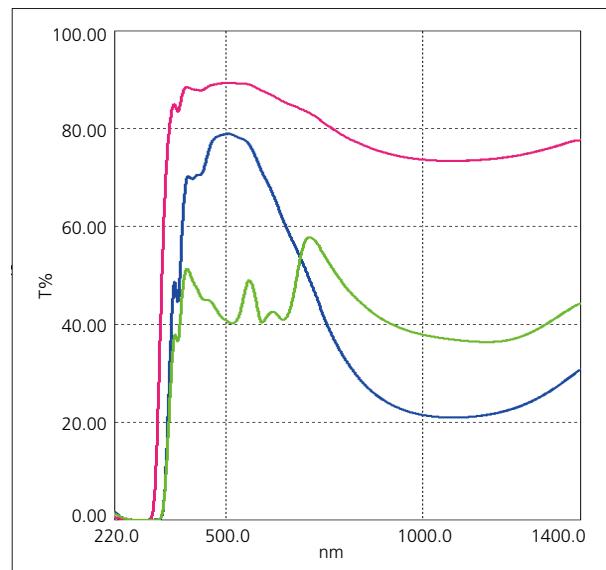


Fig. 2 Transmittance Spectra  
(Red: Transparent glass, Green: IR-cut glass A, Blue: IR-cut glass B)

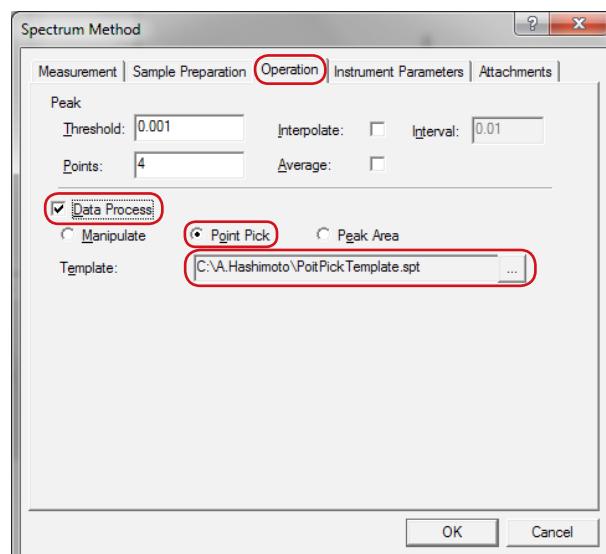


Fig. 3 Method Window for Auto Point Pick Settings

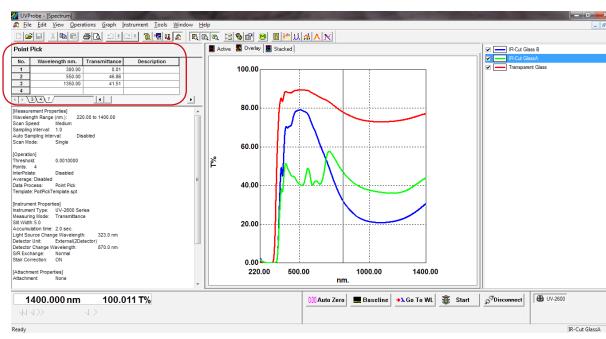


Fig. 4 Auto Point Pick Window