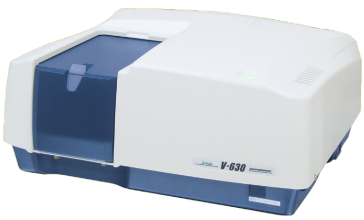
Application Note

UV-0009

Measurement of a Dichroic Mirror using the Automated Absolute Reflectance Measurement System

Introduction

A dichroic mirror is an optical element consisting of multi-layered dielectric materials that have different refractive indexes. This enables the mirror to reflect the light of a specific wavelength and transmit the light of another wavelength. Dichroic mirrors have different spectral characteristics, depending on the polarization of the incident light or angle. Therefore, in the evaluation of dichroic mirrors, it is necessary to elucidate its spectral characteristics.



V-630
UV-Vis Spectrophotometer

Absolute reflectance measurements can obtain both transmittance and reflection data by changing the incident angle or polarization of the incident light. JASCO's integrating sphere introduces the incident light with an angle of θ to a sample. The reflected light from the sample is then lead to the integrating sphere, where the detector angle is set as θ-2θ (Figure 1, right). The integrating sphere can therefore measure the absolute reflectance spectrum, which cannot be obtained by the general relative reflectance measurement system. In addition, influence from light source fluctuations is removed using a double beam method that brings the reference beam inside of the integrating sphere.

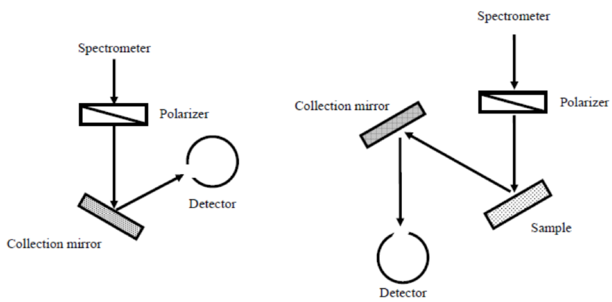


Figure 1. Relative reflectance measurement (left) and absolute reflectance measurement (right) systems.

This application note demonstrates the use of the integrating sphere to measure the polarization and incident angle dependence and evaluate the spectral characteristics of a dichroic mirror.

Keywords

V-630, UV-Visible/NIR, Integrating sphere, Absolute reflectance, Materials

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Results

Figure 2 shows the reflectance spectrum under different polarization conditions, while Figures 3 and 4 illustrate the angle dependence of the reflectance spectrum under the p and s polarizations, respectively. It is seen that for both s and p polarizations, the reflection region expands to the longer wavelength side with the increase of the incident angle.

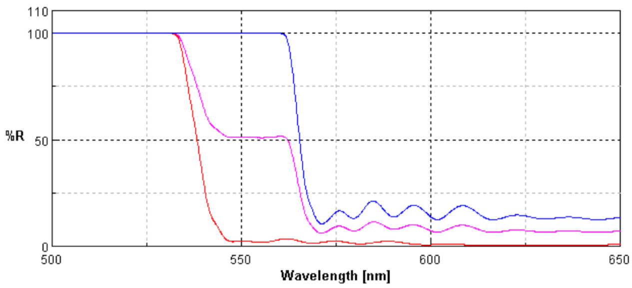

Figure 2. Reflectance spectrum of s (red), p (blue), and natural light (pink) polarizations.

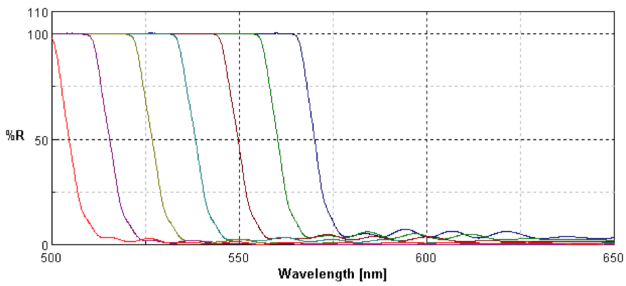

Figure 3. Angle-dependent reflectance spectrum for p polarization. The angles are the following: 30 (blue), 35 (green), 40 (maroon), 45 (teal), 50 (yellow), 55 (pink), and 60 (red) degrees.

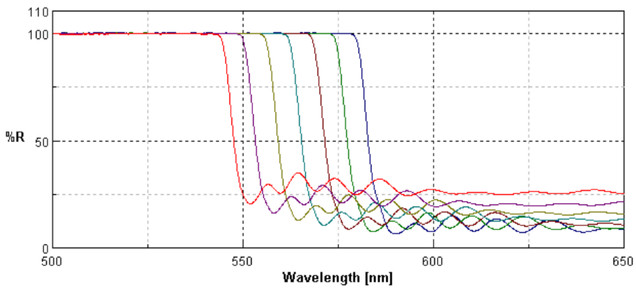

Figure 4. Angle-dependent reflectance spectrum for s polarization. The angles are the following: 30 (blue), 35 (green), 40 (maroon), 45 (teal), 50 (yellow), 55 (pink), and 60 (red) degrees.

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