

Evaluation of the privacy film using an automated absolute reflectance measurement accessory

Introduction

A privacy film which is used for smartphone displays has a characteristic structure in which clear layers and light shielding layers are interlaminated. This structure prevents a smartphone display from bystanders 'peeking' at the screen while the viewing angle depends on the height and pitch of the light shielding layers in the louver layers.

To evaluate the viewing angle or the transmittance of the louver layer, an absolute reflectance measurement accessory is an effective tool. The accessory can be used to set samples at a specified angle by rotating the sample to the source incidence and/or detector angles.

In this application, the angle dependence of the transmittance spectra of the privacy film for a smartphone is explored.

Keywords: Angle scanning measurement, Absolute reflectance measurement unit, Privacy film

Sample

Privacy film for smartphones (Figure 2)

Specification: View angle 65°
Anti-glare processing

Measurement condition

Position:	transmittance, asynchronous
Detection angle:	0°
Incidence angle:	-60° to 60°
Measurement interval:	2°
Measurement mode:	%T
Wavelength range:	380 to 780 nm
Bandwidth:	5 nm
Scan speed:	400 nm/min
Response:	0.96 sec

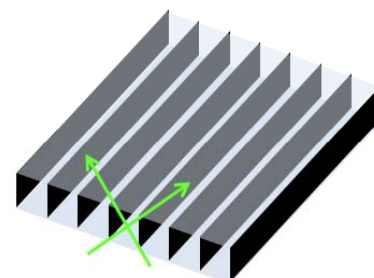


Fig. 1 Structure of louver layer

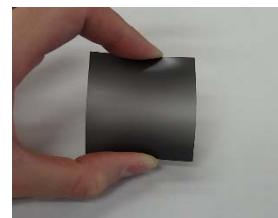


Fig. 2 Privacy film sample

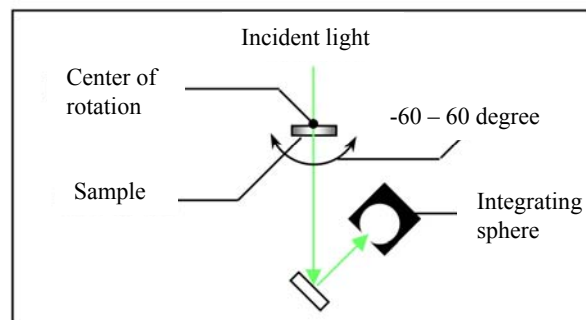


Fig. 3 Measurement image



Fig. 4 Absolute reflectance measurement system

Result

Figure 5 illustrates the interval data in which spectra were acquired every 2° from -60° to 60°.

Figure 6 outlines the transmittance spectra at 0°, 10°, 20°, 30°, 40°, 50°, and 60°.

Figure 7 provides the angle scanning transmittance data from -60° to 60° at 550 nm.

Figures 5 and 6 indicate that the film absorbs blue light at less than 400 nm and keeps the transmissivity constant at more than 400 nm, which means that the film displays the light to eyes without a large color change. As illustrated in Figure 7, the transmittance is approximately 5% near the nominal view angle of $\pm 32.5^\circ$. This characteristic is quite suitable for user privacy.

As indicated in this report, the absolute reflectance measurement system is best suited to evaluate the incident angle dependence properties of various transmittance spectra.

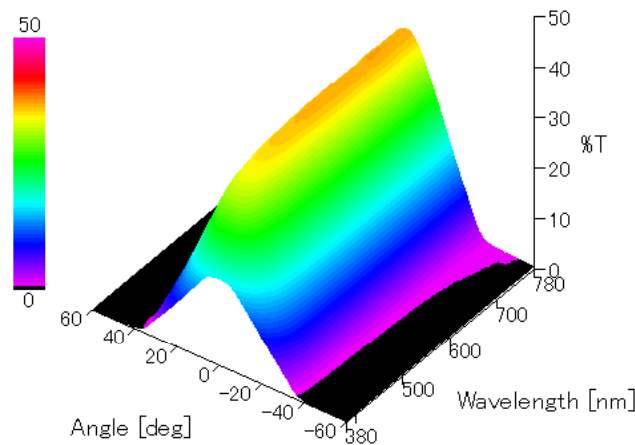


Fig. 5 Interval data of the privacy film

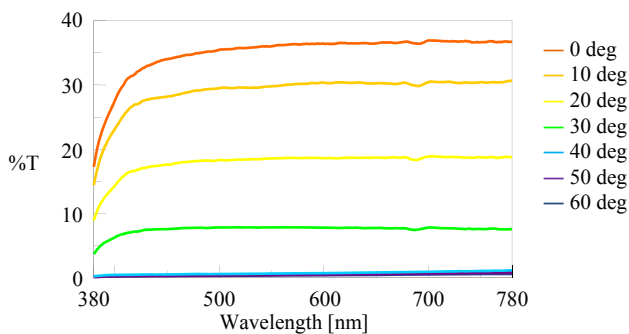


Fig. 6 Transmittance spectrum at every 10° from 0° to 60°

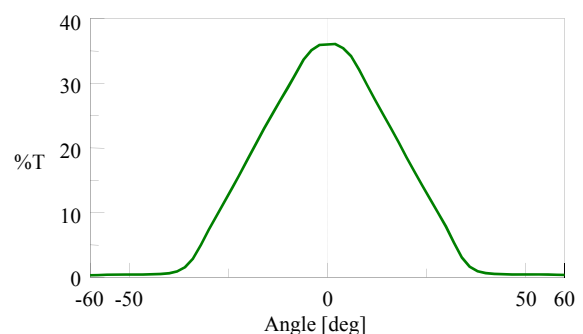


Fig. 7 Angle dependence of transmittance spectra at 550 nm