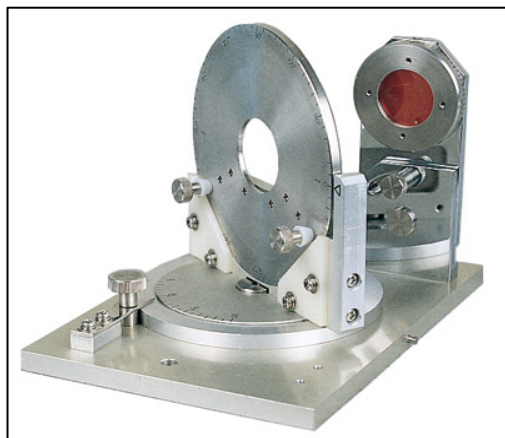


## Variable-angle transmittance measurement attachment with polarizer option

In semiconductor industry, Infrared spectroscopy is widely used for various routine analysis such as quantitative analysis of impurities like oxygen and carbon, qualitative analysis of insulator film and film thickness analysis of epitaxial film etc. as well as basic researches. Among several analytical methods, the transmission method is the most popular one in those applications, however, Silicon Wafer has high reflectance, which may cause such symptom that the reflected light from surface of Silicon Wafer returns to interferometer, resulting the noise on spectrum due to water vapor since the length of optical path with sample is different from the length without sample. JASCO VAT-500i Variable-angle transmittance measurement attachment can be used for such difficult applications of samples with reflectance. In this attachment by changing the incident angle of light against the sample surface, the reflected light would not go into interferometer. In fact, this design can drastically reduce the level of noise due to water vapor even the incident angle is changed as small as 10 to 20 degree.



VAT-500i

### Specifications

Measurement mode:	Transmission
Sample size:	Maximum: $\phi 5$ inch Minimum: $\phi 34$ mm (or 22 x 22 mm) Maximum thickness size: 4mm
Angle of incidence:	0 to 90 degree
polarizer:	Wire-grid polarizer, KRS-5

Fig.1 shows the transmission spectrum of SiO<sub>2</sub> film and Si substrate under 0 degree incident angle condition. The vapor noise cannot be eliminated by spectral subtraction even based on Si substrate as reference.

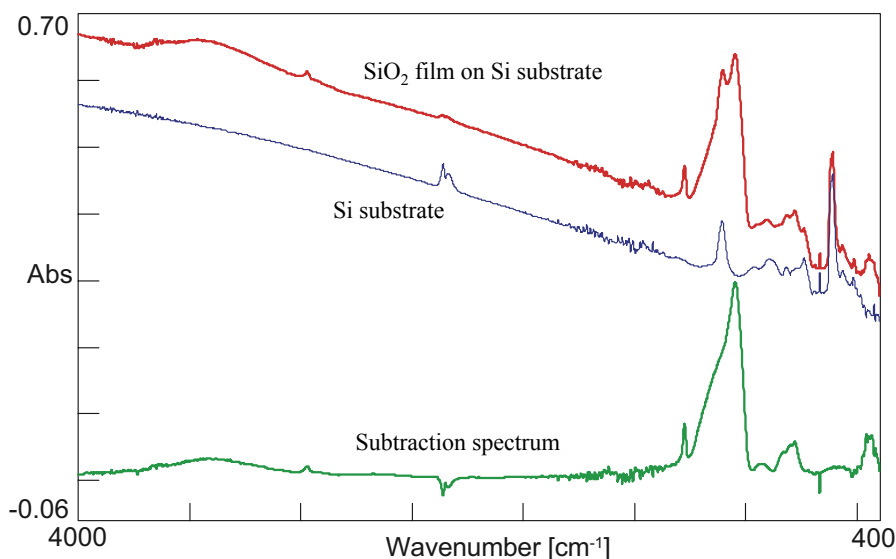


Fig.1. Transmission spectrum of SiO<sub>2</sub> film under 0 degree incident angle condition

Fig.2 shows the transmission spectrum of SiO<sub>2</sub> film under several different incident angle conditions from 0 to 20 degree.

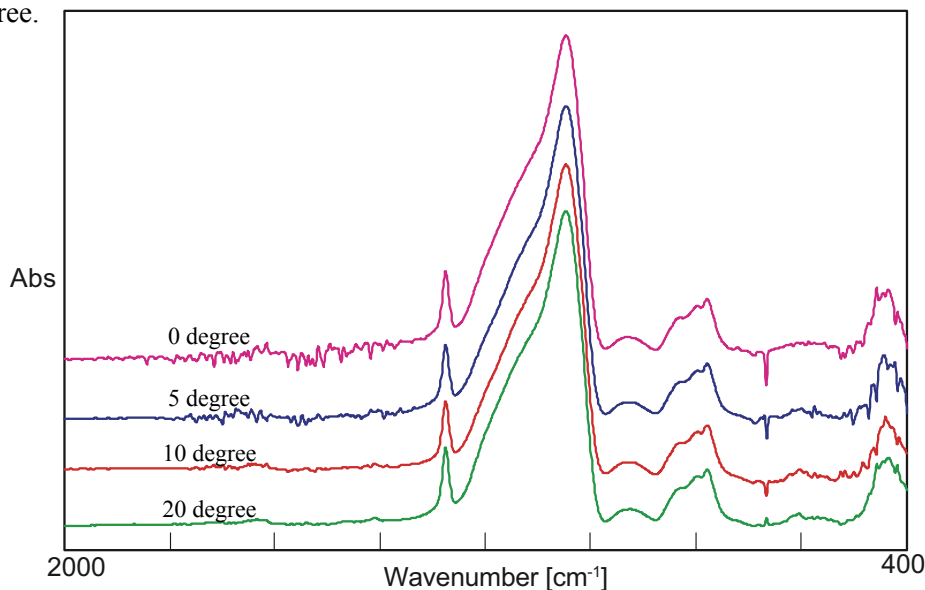


Fig.2. Transmission spectrum of SiO<sub>2</sub> film under several different incident angle conditions from 0 to 20 degree

In addition, for this VAT-500, the polarizer can be mounted in optical path if necessary. This capability is effective for other applications such as analysis of polymer film and coating film, and also the measurement of Dichroism of oriented membrane. Fig. 3 shows the spectra showing Dichroism measurement of oriented polypropylene film. Using the rotatable sample holder, the direction of orientation can be confirmed for unknown oriented sample. As a result of measurements with different angles at 0 and 90 degree, it was confirmed that the main axis of this sample was oriented in 0 degree direction. Fig. 3 shows the absorbance spectra at 0 and 90 degree position, indicating that this polypropylene is isotactic polypropylene. In addition, the large difference of absorption at 1168cm<sup>-1</sup> and 998 cm<sup>-1</sup> is affected due to crystallization and isotactic helix structure, which can be utilized as a degree of crystallization.

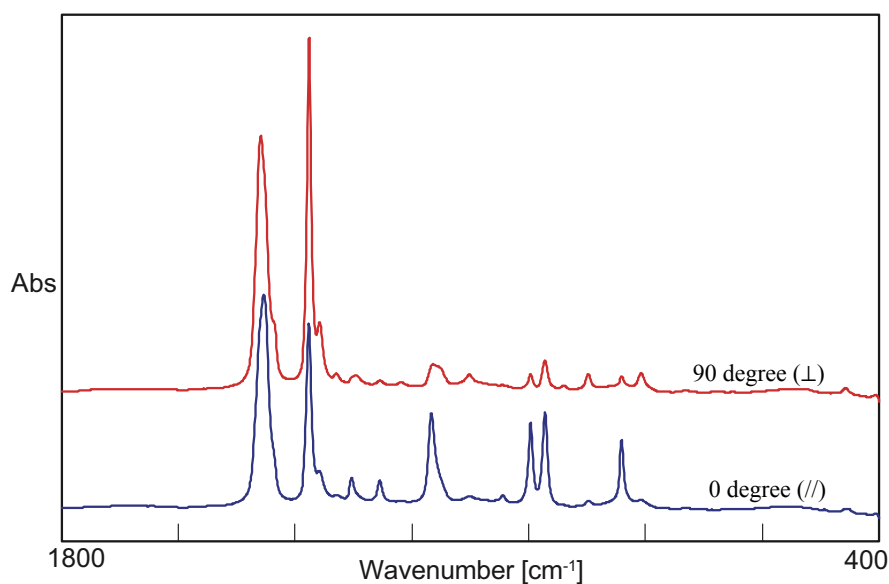


Fig.3. Transmission spectrum of Dichroism measurement of oriented polypropylene film

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