# Reflectance Spectrum of $SiO_2$ Film by Small Size 5° Specular Reflectance Accessory

## INTRODUCTION

The small size 5° specular reflectance accessory allows the measurement of a reflectance spectrum for a micro sample of about ϕ5 mm at an incident angle of 5° for the measurement part. This time, the reflectance spectrum of the $SiO_2$ film on a silicon substrate used for semi-conductors, etc. was measured. As a result, a reflectance spectrum with an interference fringe was obtained. By using this accessory, the low noise levels of micro samples can be easily measured.

## SAMPLE

Sample : $SiO_2$ film of silicon substrate
10 mm(H) × 10 mm(W) × 1 mm(T)

## INSTRUMENT CONDITIONS

Instrument : U-4100 spectrophotometer (solid sample measurement system)

Measurement wavelength region : 240 - 2500 nm
Sampling interval : 1 nm

| [UV/VIS] | | [NIR] | |
|---|---|---|---|
| Scan speed | : 300 nm/min | Scan speed | : 750 nm/min |
| Slit | : 8 nm | Slit | : Automatic control |
| | | PbS sensitivity | : 2 |

## ACCESSORY

Small size 5° specular reflectance accessory
(P/N : 134-0103)

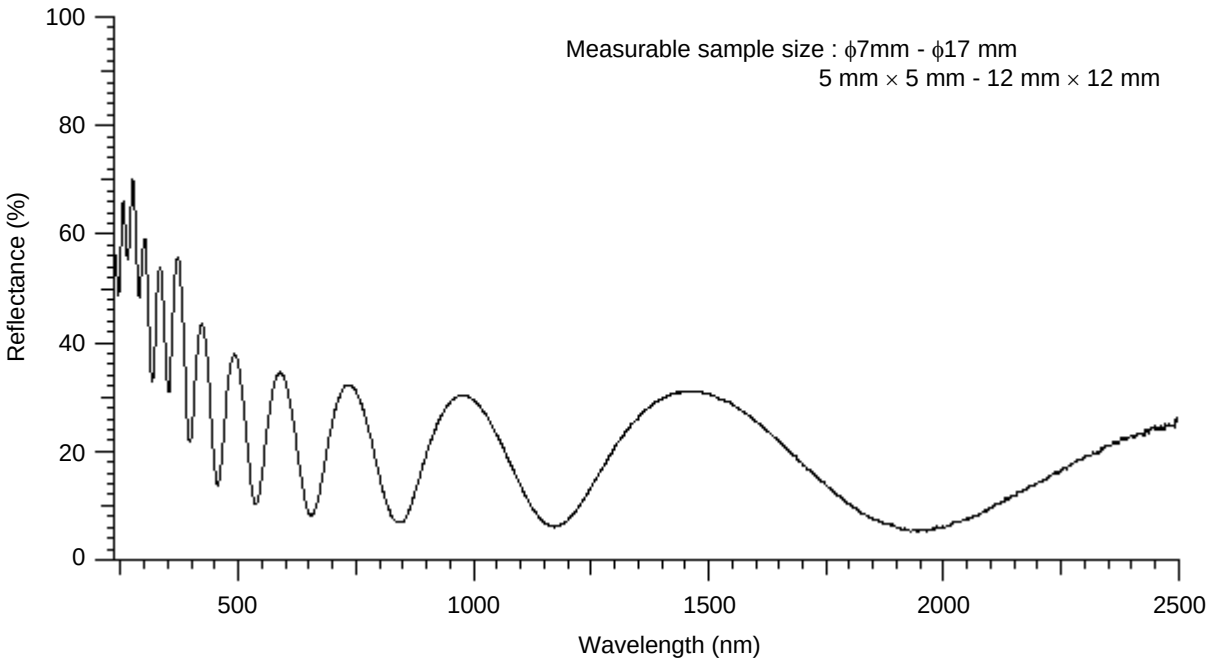


Figure 1 : Reflectance Spectrum of $SiO_2$ Film on Silicon Subtrate

KEY WORDS
Electronics/Semiconductor Related, Semiconductor,
Silicon Substrate, Reflectance Spectrum, Absolute Reflectance,
Small Size 5° Specular Reflectance Accessory, Spectrophotometer, U-4100

Spectrophotometer (UV)

Sheet No. UV110004-01

# Measurement of Film Thickness of $SiO_2$ Film (Observation of Sccaning Electron Microscope)

## INTRODUCTION

Based on the obtained spectrum, the film thickness was calculated by using the film thickness calculation, the function enabled by the optional application measurement package. By entering the refractive index and incident angle, the film thickness can be easily calculated. As a result, the film thickness was found to be 1 μm. In addition, by using S-3400N scanning electron microscope which allows the clear confirmation of the microscopic structure of a sample, the cross section of the sample was observed. The film thickness of 1 μm was confirmed and thus, the validity of the measurement by the spectrophotometer was confirmed. By measuring the reflectance spectrum, its film thickness can be calculated easily.

## SAMPLE

Sample : $SiO_2$ film on silicon substrate
10 mm(H) × 10 mm(W) × 1 mm(T)

## OBSERVATION CONDITIONS

| | |
|---|---|
| Instrument | : Hitachi S-3400N Scanning Electron Microscope |
| Observation condition | : high vacuum reflection electron image |
| Accelerated voltage | : 5 kV |
| Observation magnification | : × 20,000 |

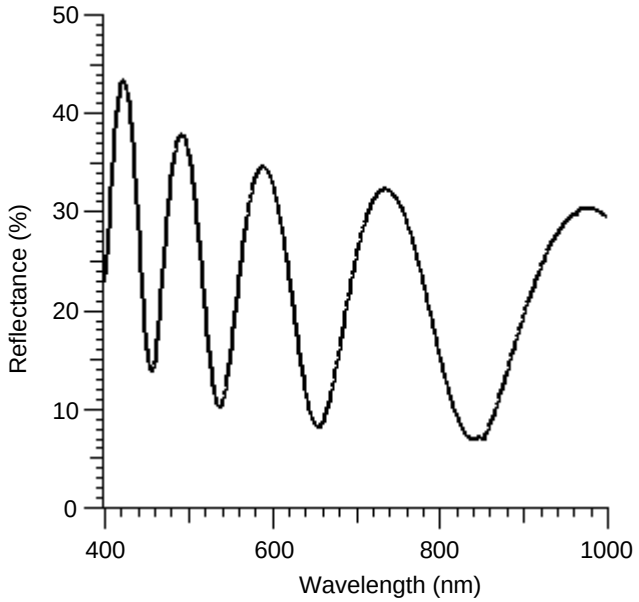


Figure 2 : Reflectance Spectrum of $SiO_2$ Film on Silicon Substrate
(Enlarged Spectrum of Figure 1)

* Refer to UV110004-01 for the instrument conditions.

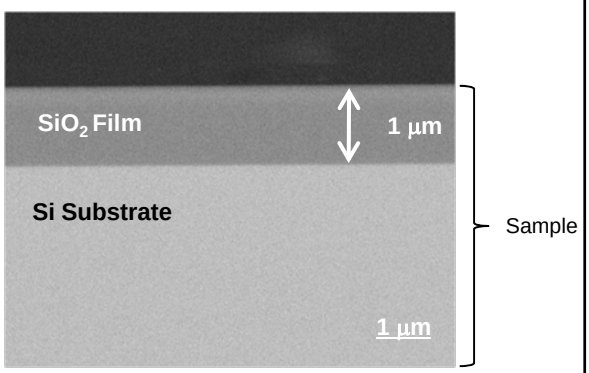


Figure 3 : SEM Image of Sample Cross Section

KEY WORDS
Electronics/Semiconductor Related, Semiconductor,
Silicon Substrate, Reflectance Spectrum, Absolute Reflectance,
Small Size 5° Specular Reflectance Accessory, Spectrophotometer,
Hitachi Scanning Electron Microscope, U-4100, S-3400N

Spectrophotometer (UV)

Sheet No. UV110004-02