

Spectroscopic Ellipsometry

- 1/ A spectroscopic ellipsometer measures a transparent film ($n=1.5$) on a silicon substrate ($n=3.87$, $k=0.02$ at 633 nm) at an angle of 70° . If the measured Δ is 180° , what does this indicate about the sample?

- 2/ Calculate the Brewster angle for a light beam traveling from air ($n_1 = 1$) to a silicon substrate ($n_2=3.85$) at a wavelength where the silicon is non-absorbing. The Brewster angle is the angle of incidence which p-polarized light (polarized parallel to the plane of incidence) is completely transmitted through a boundary, with zero reflection.

- 3/ A linearly polarized light ray incident at an angle of inclination 65° on the surface of a transparent material. If the refractive index of the material is $n_0=1$ (in air). The following values were obtained: $\Delta = 180^\circ$ and $\psi = 28^\circ$. Calculate the refractive index (n) of the glass, assuming the absorption of $k = 0$.

- 4/ A thin film of SiO_2 ($n=1.46$) is grown on a Si substrate ($n= 3.85$) in air. Explain why 70° is a common measurement angle, even if the pure substrate Brewster angle is 75.4° .

- 5/ Visible light has a wavelength range of about $400\text{-}700$ nm. What is the corresponding frequency range? What is the corresponding energy range of photons?