1. An i-line resist has the following properties:

\[ A = 0.85 \ \mu \text{m}^{-1} \]
\[ B = 0.05 \ \mu \text{m}^{-1} \]
\[ C = 0.018 \ \text{cm}^2/\text{mJ} \]

Refractive index = 1.72

The resist is coated to a thickness of 1.1 \( \mu \text{m} \) on a glass substrate optically matched to the photoresist. At the beginning of exposure, what percentage of the incident light makes it to the bottom of the resist?

Note that \( T_{12} = 1 - \left( \frac{n_2 - n_1}{n_2 + n_1} \right)^2 \)

2. From the transmittance curve below, estimate the values of \( A, B \) and \( C \). The resist thickness used was 0.75 \( \mu \text{m} \) and the measurement was performed in the standard way. Assume a typical i-line resist with refractive index = 1.69.
3. For a chemically amplified resist (and ignoring the effects of diffusion and acid loss on concentration),

\[ h = 1 - e^{-C I t} \]

\[ m = e^{-K_{amp} t_{PEB} h} \]

From these equations,

(a) Derive an expression for the relative bake time sensitivity of \( m \) (i.e., calculate \( dm/d\ln t_{PEB} \)).

(b) Derive an expression for the relative temperature sensitivity of \( m \) (i.e., calculate \( dm/d\ln T \)). From this, will a low activation energy resist or a high activation energy resist be more sensitive to temperature variations?

(c) Does the presence of base quencher change the bake time or temperature sensitivity of \( m \)?

4. Why does the addition of base quencher reduce the sensitivity of the resist to airborne base contaminants?