1.1.1 *Estimating IR Performance of a Window*

To obtain the overall transmission, one needs to account for both the reflection at the interface and the thickness of the material. A first-order estimate can be obtained by combining the equations for transmission at an interface and absorption to yield

$$I(z)/I = T \times I(z) = \left[1 - \left|\frac{n_1 - n_2}{n_1 + n_2}\right|^2\right] \times e^{-\alpha z} \quad \textbf{Equation 1}$$

Figure 4 shows the results of this simple model for IR transmission through a material as a function of thickness. The initial transmission for thin windows is dominated by the effects of refractive index. The refractive index is shown in parentheses in the legend.

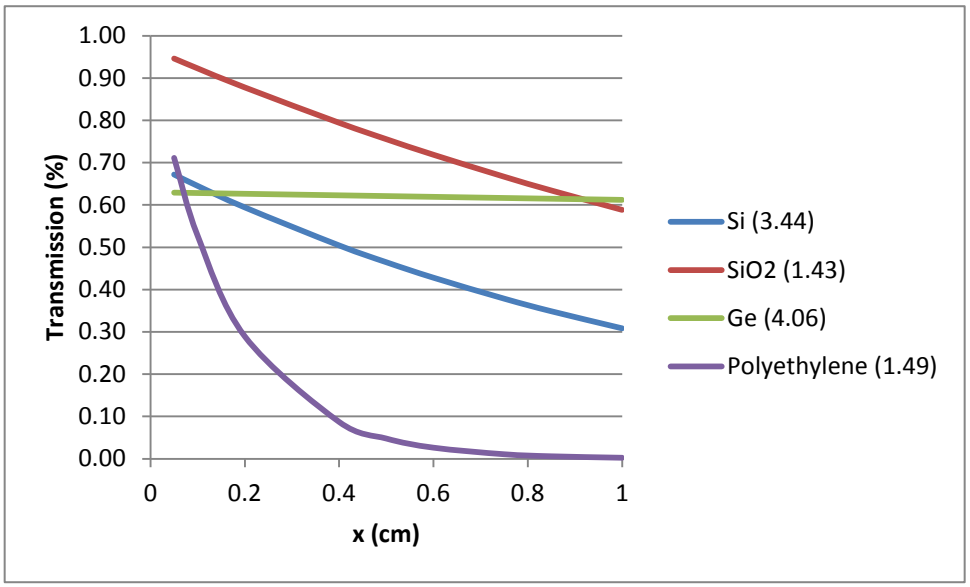

Figure 1 IR Transmission for Selected Materials vs Thickness (x)

The decrease in intensity as a function of thickness then depends on the absorption. Both the refractive index, n, and absorption, α, are wavelength dependent properties of the material. For some materials, such as Polyethylene, the processing of the material will also affect the material properties.