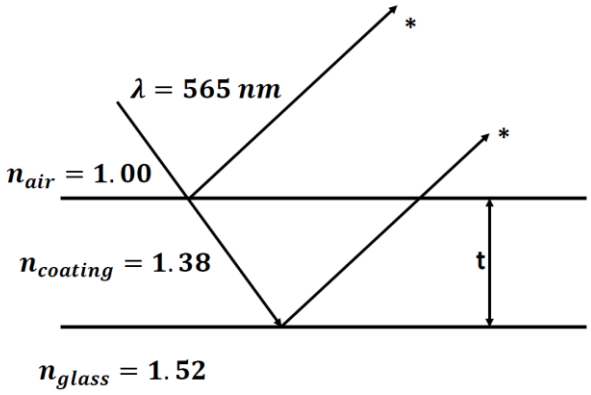
6. A nonreflective coating of magnesium fluoride (n = 1.38) covers the glass (n = 1.52) of a camera lens. Assuming that the coating prevents reflection of yellow-green light (wavelength in vacuum = 565 nm), determine the minimum nonzero thickness that the coating can have.



$$\textbf{Total Phase Diff} = \textbf{Optical Path Diff} + \textbf{Phase Shifts} = \left(m + \frac{1}{2}\right)\lambda$$

This is for destructive interference which is what a non-reflecting coating would need.

Since both rays are phase shifted due to going from lower n reflecting from higher n, the two phase shifts cancel. So the only phase difference is the optical path difference.

$$2n_{coating}t = \left(m + \frac{1}{2}\right)\lambda$$

For smallest thickness we make m smallest which would be zero.

$$t = \frac{\left(\frac{1}{2}\right)\lambda}{2n_{coating}} = \frac{\lambda}{4n_{coating}} = \frac{565\ nm}{4(1.38)} = 102.4\ nm$$

$$\boxed{t = 102\ nm}$$

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