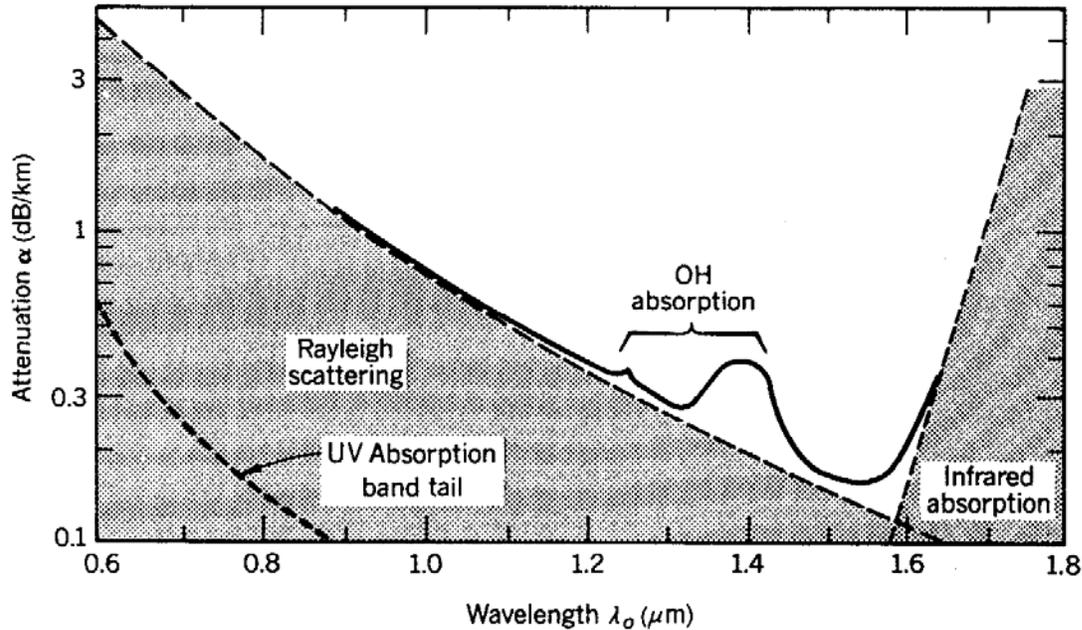


## 3.46 PHOTONIC MATERIALS AND DEVICES

Quiz 1—February 13, 2006



The wavelength dependence of loss (dB/km) of a silica fiber used in telecommunications is bounded by *Raleigh scattering* at short wavelengths and *Infrared absorption* at long wavelengths. The minimum loss occurs at  $\lambda = 1550 \text{ nm}$ .

- Comment on the source of the Raleigh scattering in terms of materials inhomogeneity.
- The Infrared absorption is due to a resonant vibration of a  $\text{Si}^+\text{-O}^-$  ionic dipole oscillator. Give a materials composition solution for moving the absorption (resonant frequency) to longer wavelengths.

Name: \_\_\_\_\_