Fluorescence

Fluorescence Quantum yield:
$$\Phi = \frac{k_r}{k_r + k_{nr}}$$

Fluorescence Lifetime:

$$I(t) = I_0 \exp\left(-\frac{t}{\tau}\right) \qquad \tau_0 = \frac{1}{k_r^S + k_{nr}^S}$$

Frequency domain spectroscopy

$$\tan\phi = \omega\tau \qquad M = \frac{B/A}{b/a} = \frac{1}{\sqrt{1 + \omega^2\tau^2}}$$

Raman

Wave number

$$\sigma[in\ cm^{-1}] = \frac{10^7}{\lambda\,[in\ nm]}$$

Relative wavenumber

$$\Delta\sigma\ [in\ cm^{-1}] = \left(\frac{1}{\lambda_1} - \frac{1}{\lambda_2}\right) 10^7\ [in\ nm]$$

Optical trapping

Force acting on a dipole

$$f_i^d = \frac{1}{4}\epsilon_0(\epsilon - 1)\nabla_i\,|\,E\,|^2$$