

Chapter 1

Resonant X-ray Spectroscopy

1.1 X-ray Resonance

1.2 Refractive Index

$$n(E) = 1 - \delta - i\beta \quad (1.1)$$

$$= 1 - \frac{r_0}{2\pi} \lambda^2 \sum_q N_q (f'_q(E) + i f''_q(E)) \quad (1.2)$$

1.3 Absorption

$$\beta \quad (1.3)$$

1.4 Dispersion

$$\delta \quad (1.4)$$

1.5 Kramers Kronig Relations

$$f'(E) = Z^* - \frac{2}{\pi} P \int_0^\infty \frac{x f''(x)}{x^2 - E^2} dx \quad (1.5)$$

1.6 Contrast

Contrast occurs when who materials that have different complex refractive indexes are combined (i.e. Copolymers or mixes) and consequently

$$\text{Contrast} = \Delta\delta^2 + \Delta\beta^2 \tag{1.6}$$

1.7 Tender Resonance X-ray Spectroscopy (T-ReXS)