

Data Table 3 Anatase, TiO₂ (12)

Tetragonal, space group $I4_1/amd$, No. 141; $a = 3.785$, $c = 9.515$ Å; $Z = 4$,
 $V = 136.31$ Å³

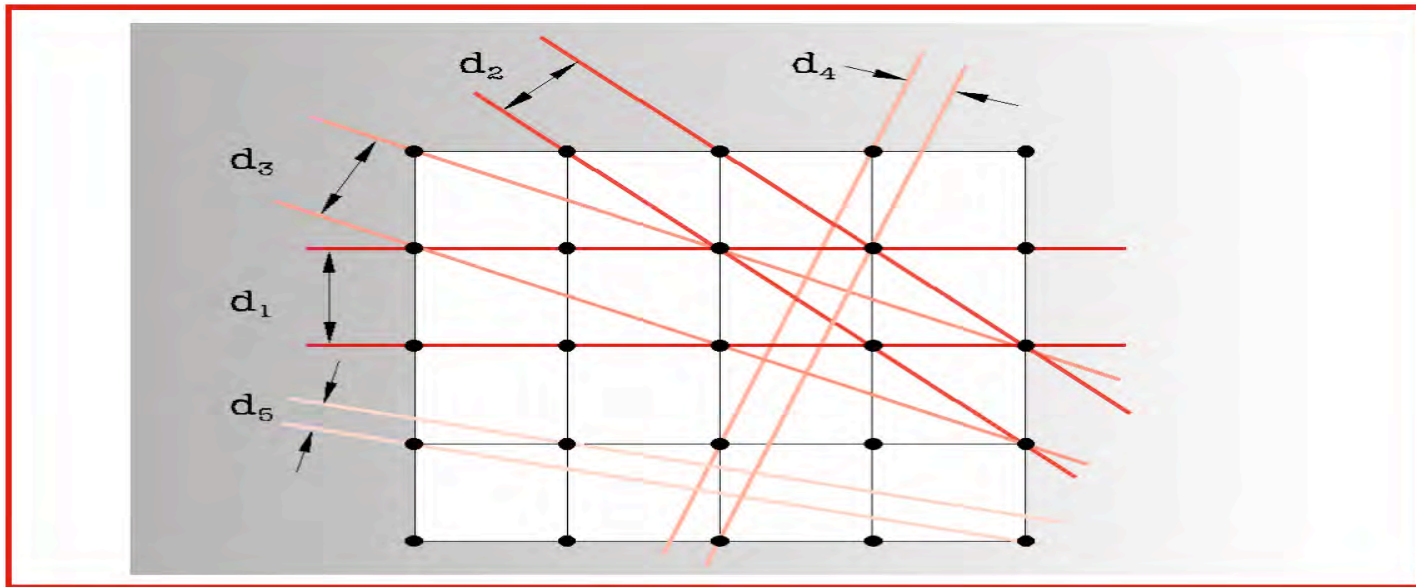
Atomic Positions

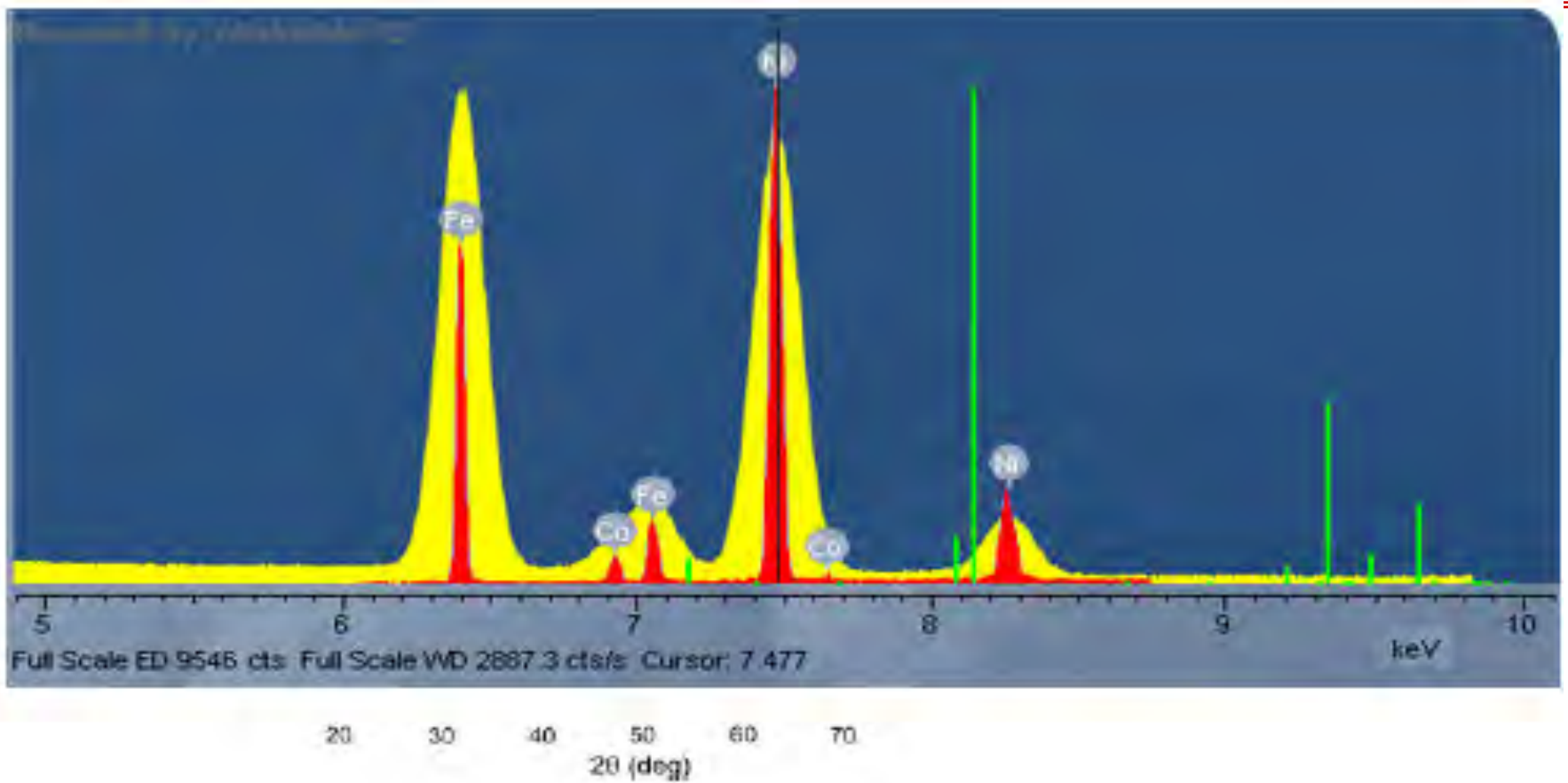
Ti in 4(*a*): $0,0,0$; $0,\frac{1}{2},\frac{1}{4}$; *bc*

O in 8(*e*): $0,0,z$; $0,0,\bar{z}$; $0,\frac{1}{2},z + \frac{1}{4}$; $0,\frac{1}{2},\frac{1}{4} - z$; *bc*; $z = 0.2066$

Atomic Distances

Ti–O = 1.89_3 Å (4×), 1.96_6 Å (2×); mean = 1.91_7 Å





WD-XRF (WDX) vs EDS of Tool Steel

Rayleigh scattering

$$\bar{\nu}_0 = 20492 \text{ cm}^{-1}$$

$$\lambda_0 = 488.0 \text{ nm}$$

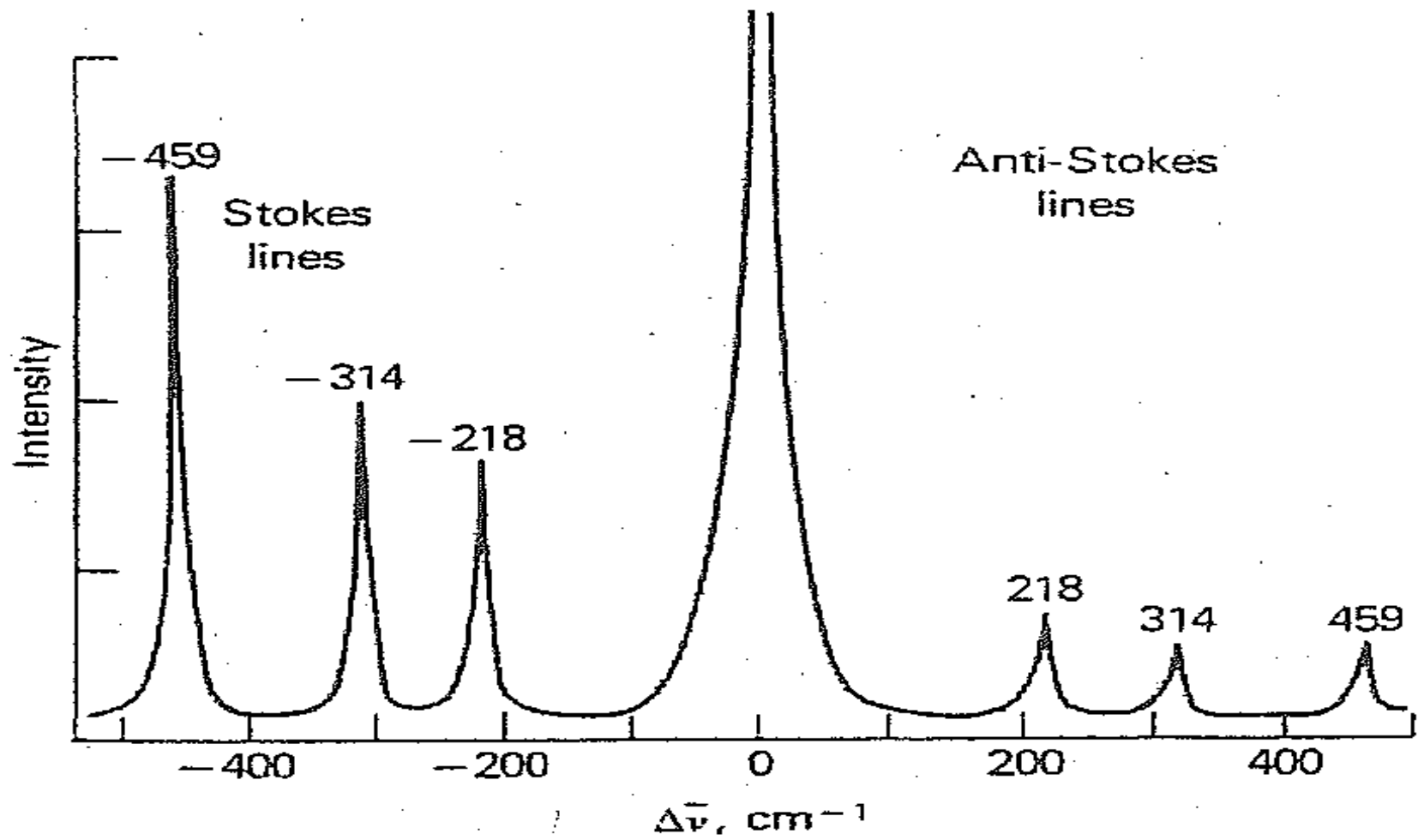
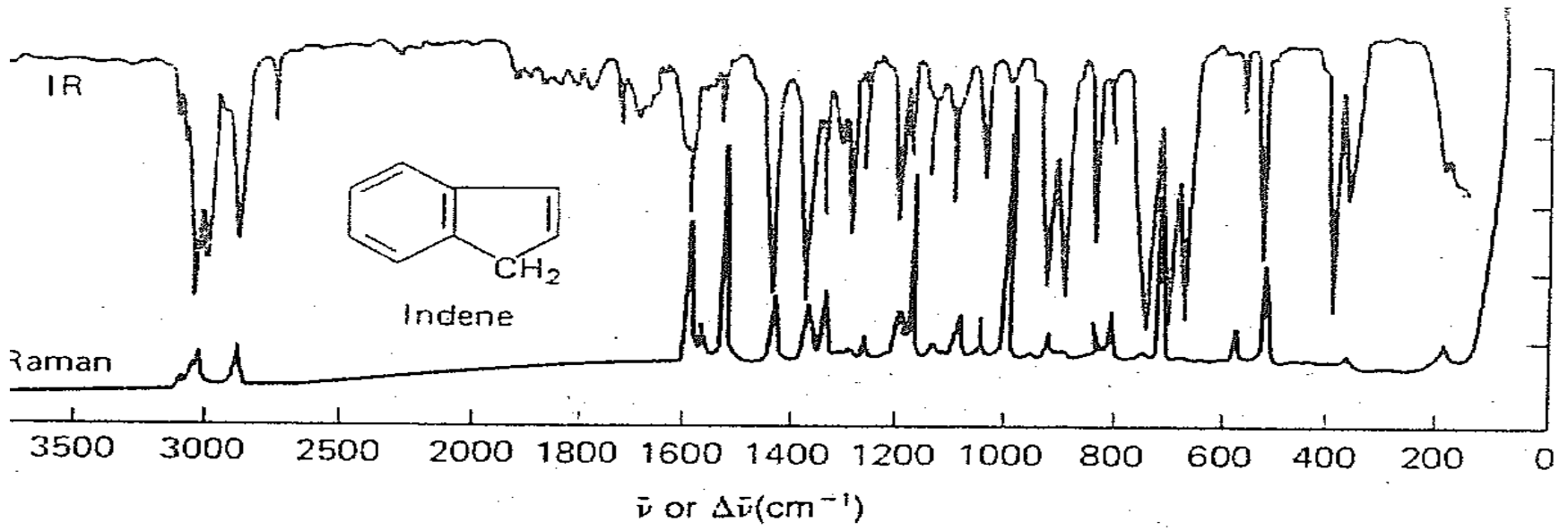
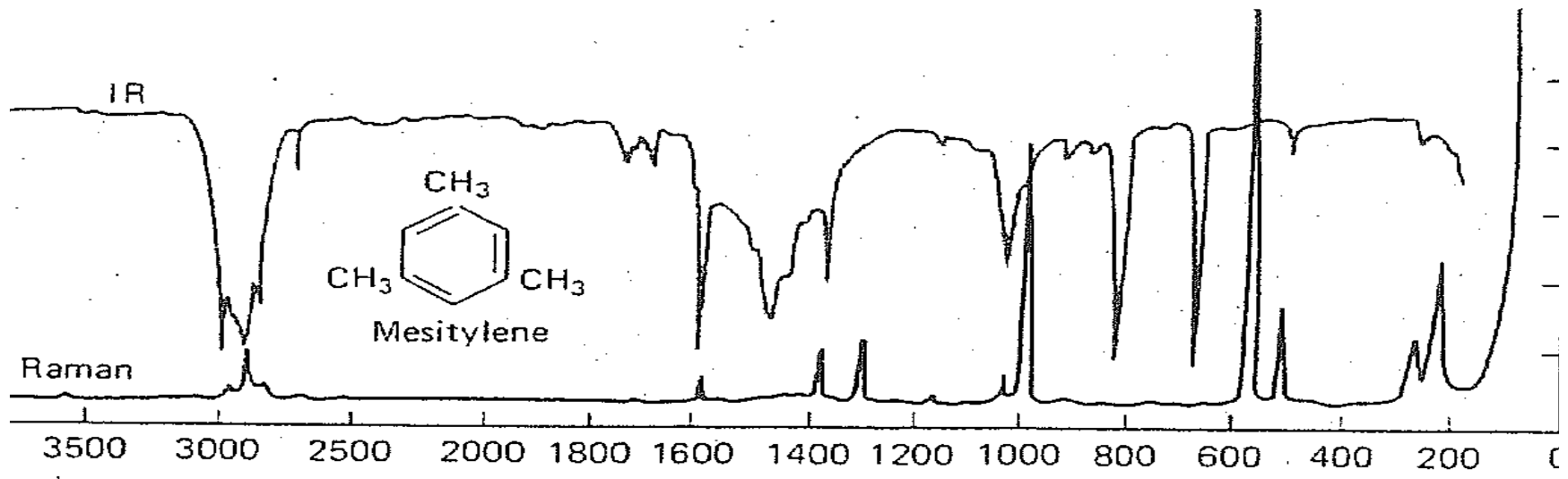
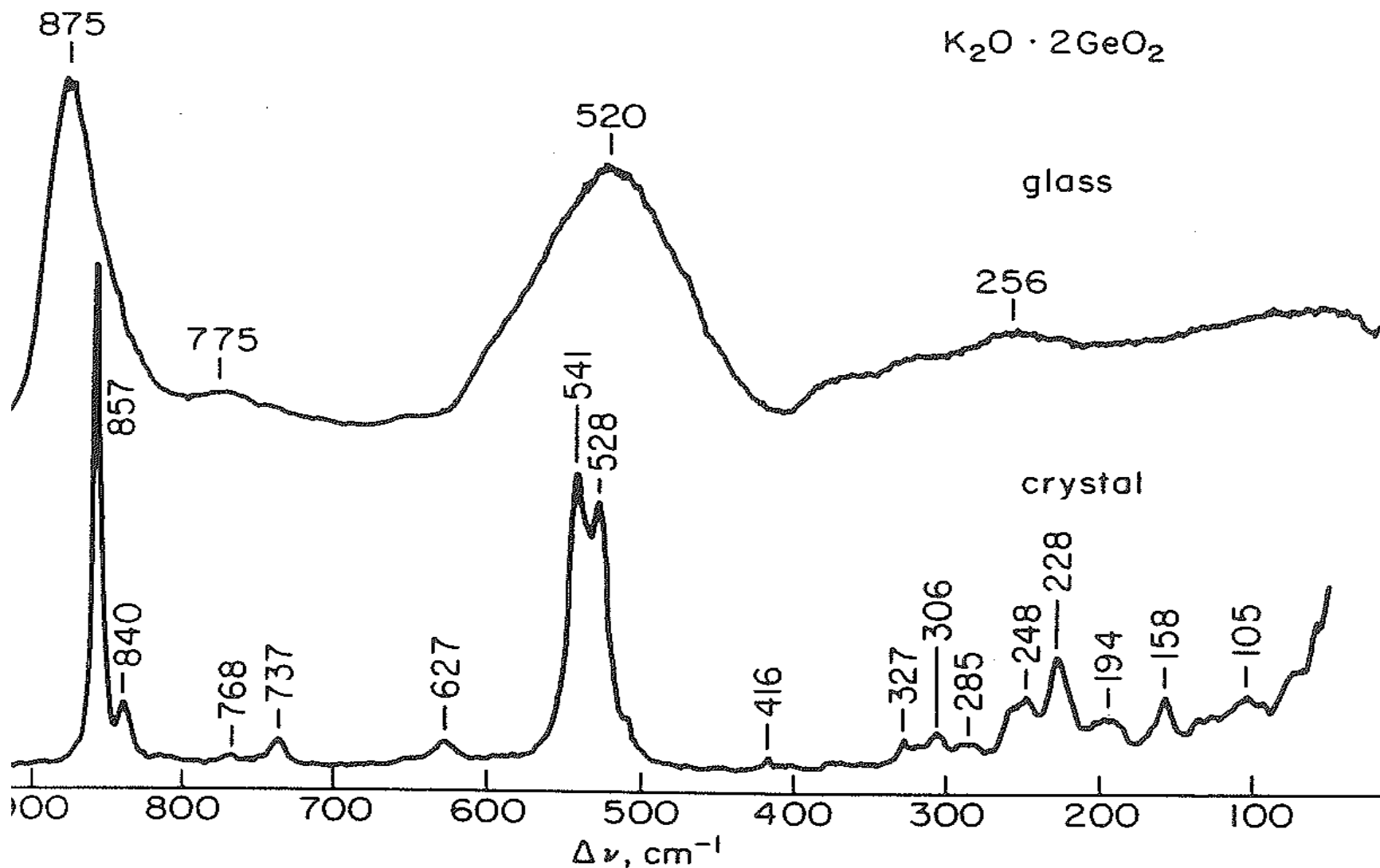


FIGURE 13-1 Raman spectrum for CCl_4 excited by laser

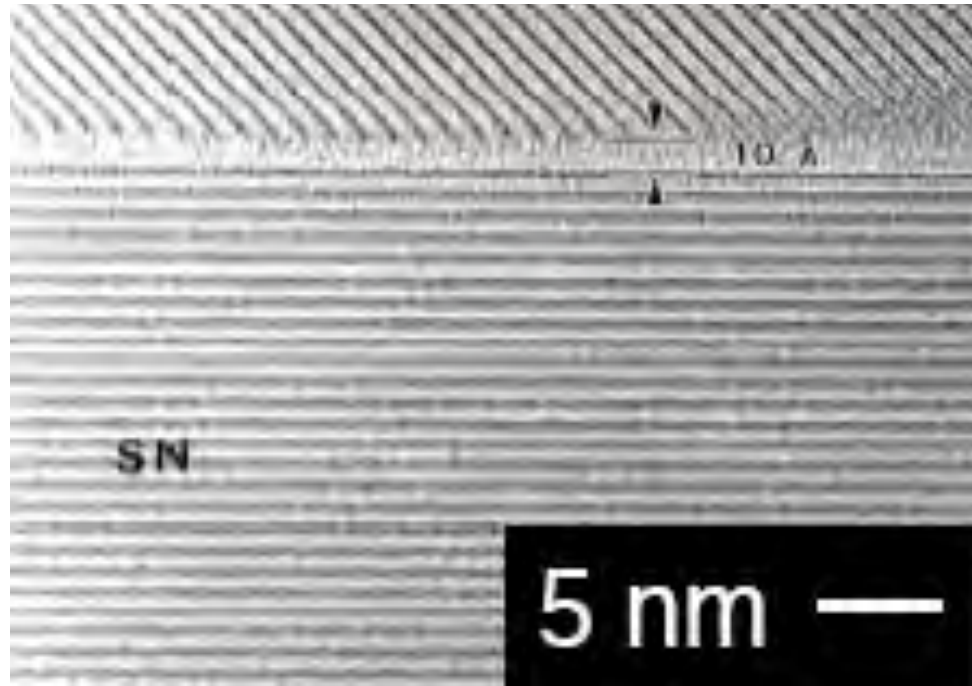


13-3 Comparison of Raman and infrared spectra. (Courtesy Perkin-Elmer)



Raman spectra of crystalline and glassy potassium digermanate show comparison between crystal spectra and glass spectra.

HRTEM studies often show thin IGFs in polycrystalline ceramics

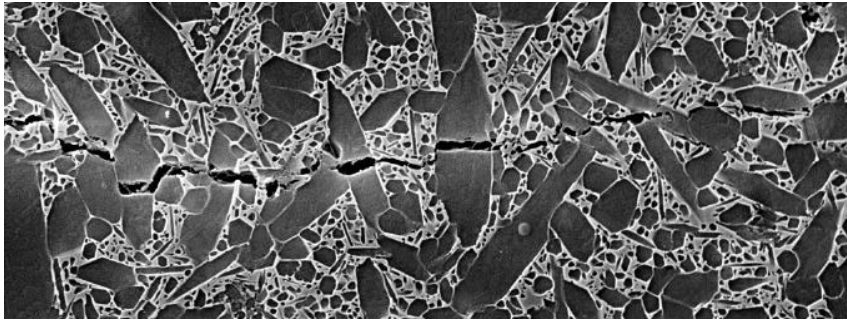


Kleebe, et al, JACerS 76(1993)1969

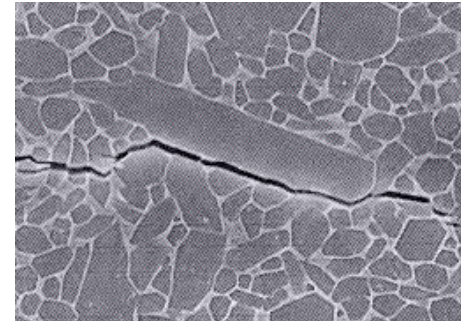
THIS AMORPHOUS IGF COMES FROM IMPURITIES THAT SEGREGATE TO SURFACES OR FROM ADDITIVES USED AS SINTERING AIDS

WHILE IGFs MAKE UP ONLY A SMALL VOLUME % OF A MATERIAL, THEY CAN STRONGLY INFLUENCE MATERIAL PROPERTIES (SUCH AS MICROSTRUCTURE, MECHANICAL PROPERTIES, CORROSION, AND ELECTRICAL PROPERTIES)

CHANGE OF ONE SPECIES IN THE IGF COMPOSITION CAN CHANGE FRACTURE BEHAVIOR



Transgranular fracture
Lu in IGF

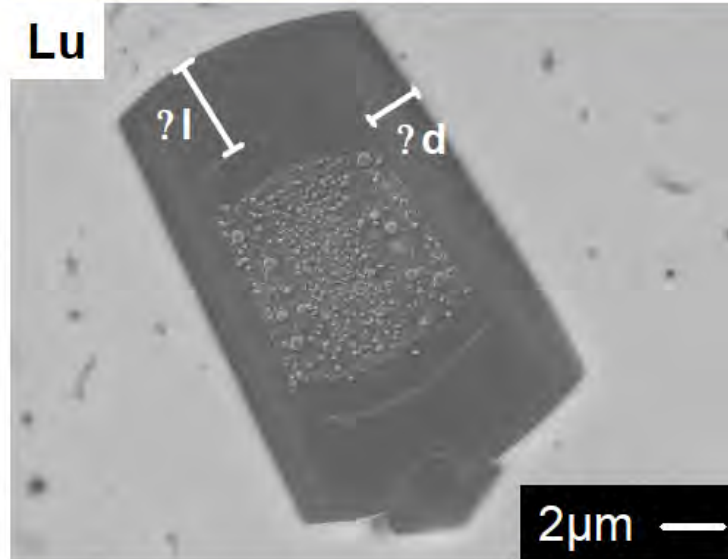


Intergranular fracture
La in IGF

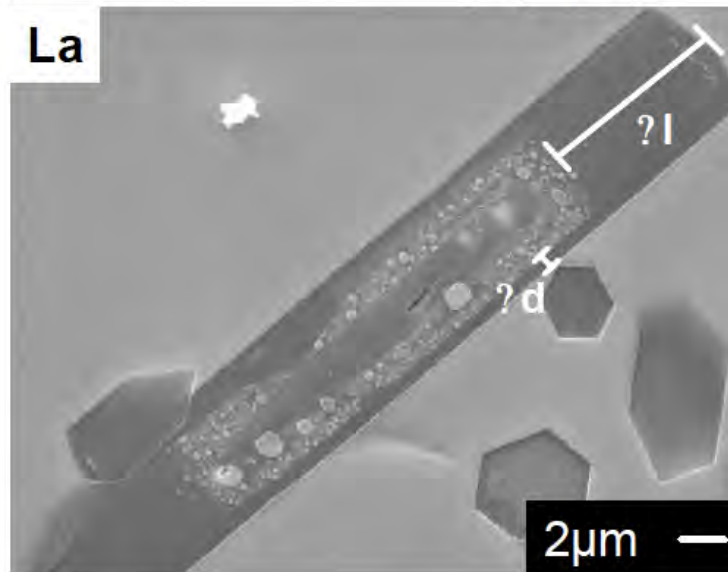
Properties can be significantly affected by the atomistics of the IGF

Growth ratio

Lu

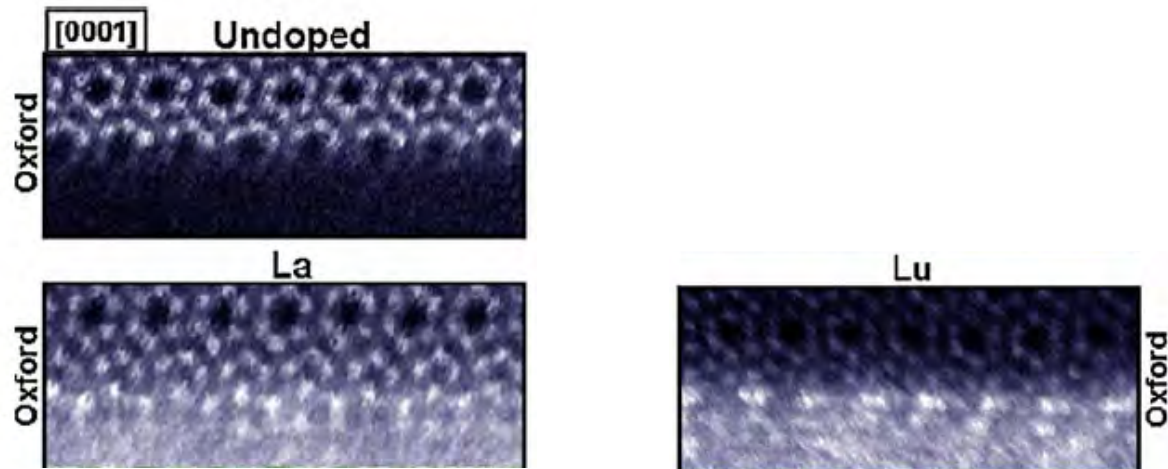


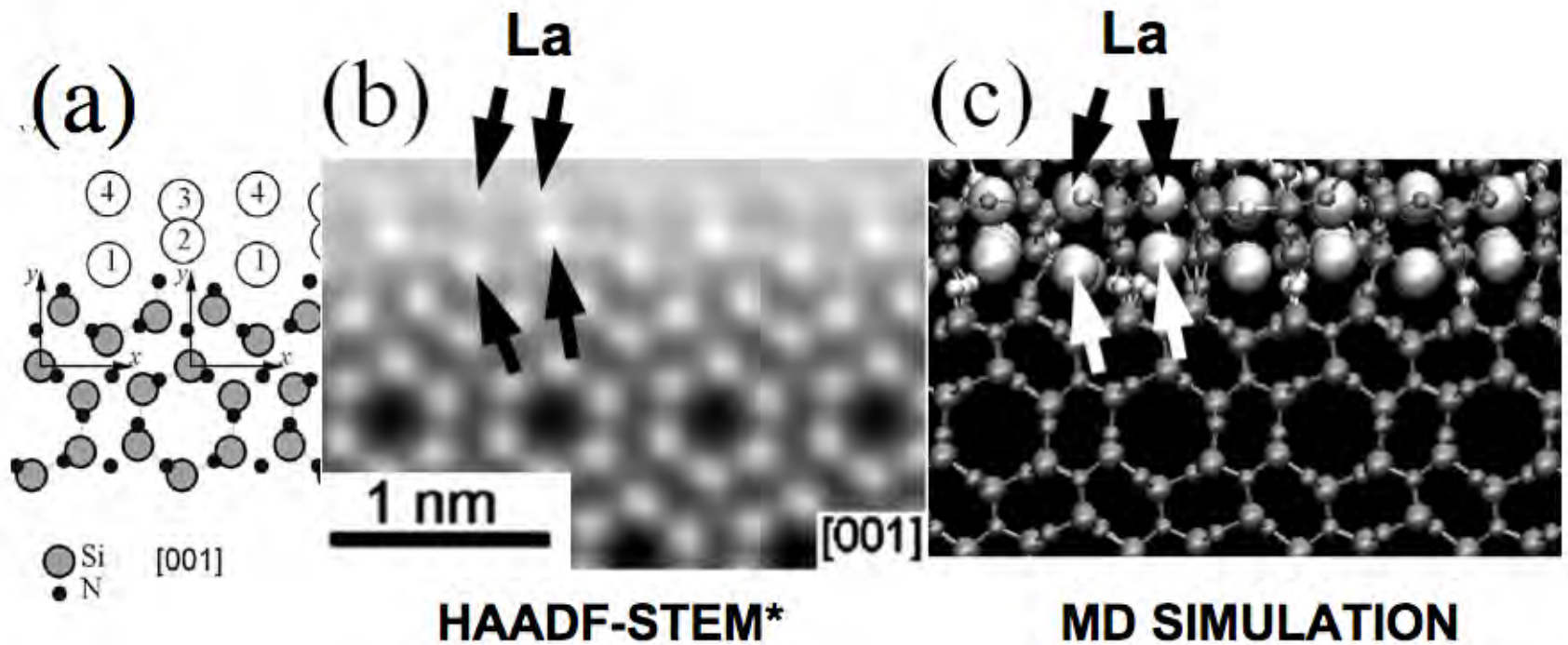
La



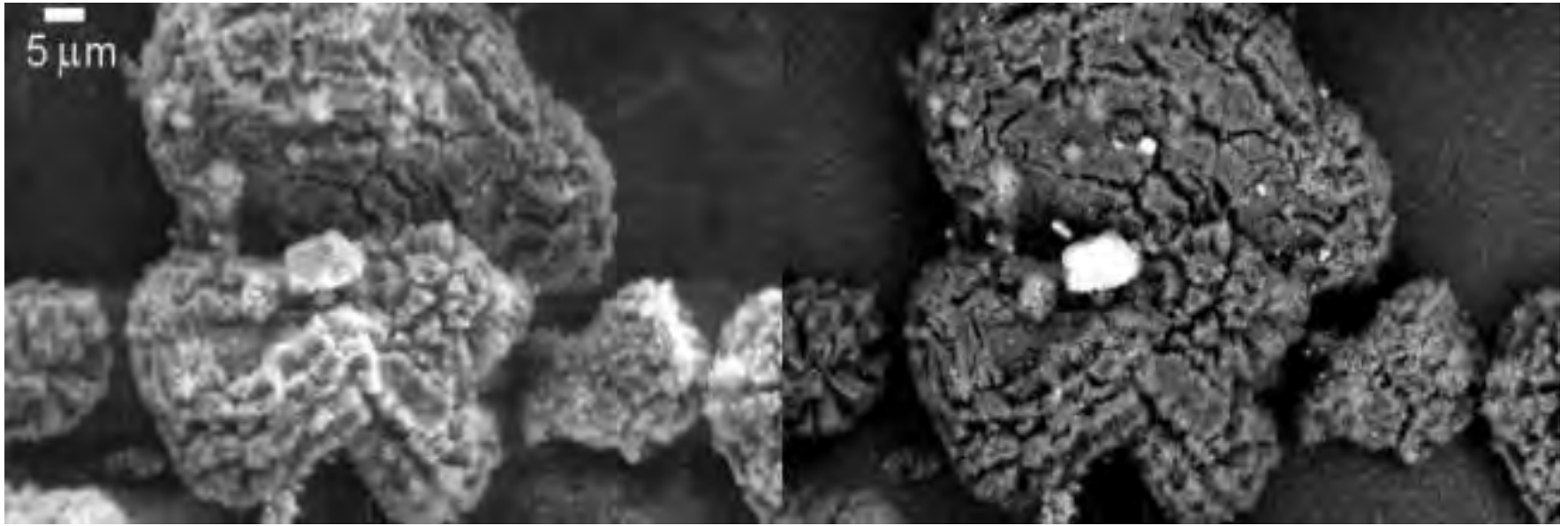
Satet et al. NANOAM

Lu on Silicon Nitride prism surface (HAADF-STEM)





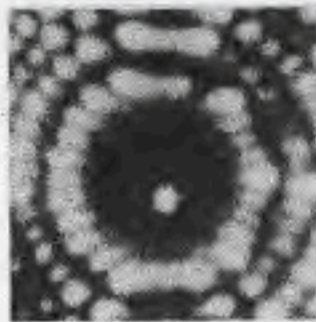
*Winkelman et al. APL 2005



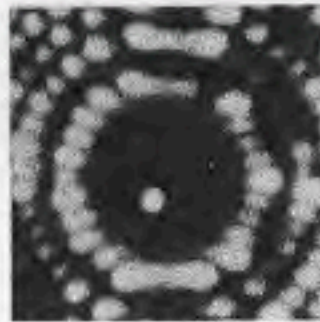
SEM images of Fe particles in carbon recorded with the secondary electron (left) and the back-scattered (right) electron detector. The BSE image shows the Fe particles with bright contrast.

to (111)
←

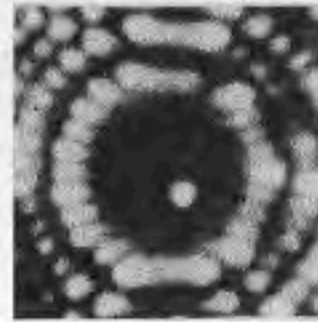
to (100)
→



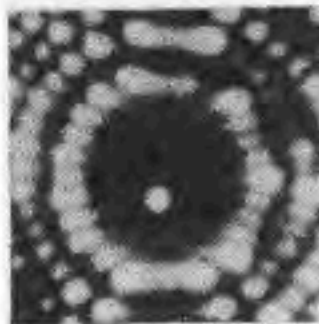
(a)



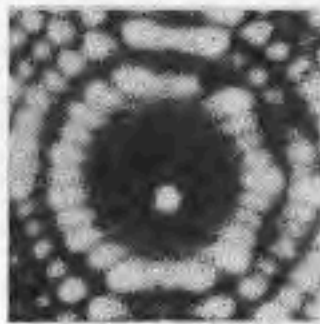
(b)



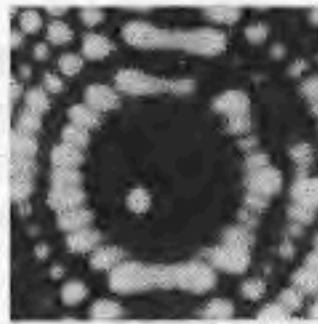
(c)



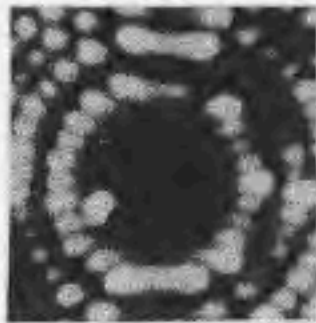
(d)



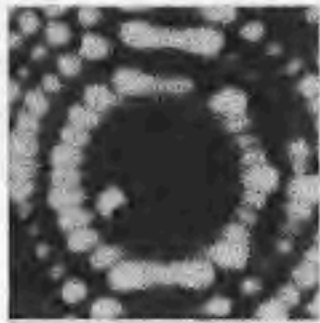
(e)



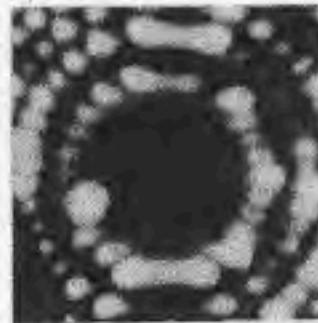
(f)



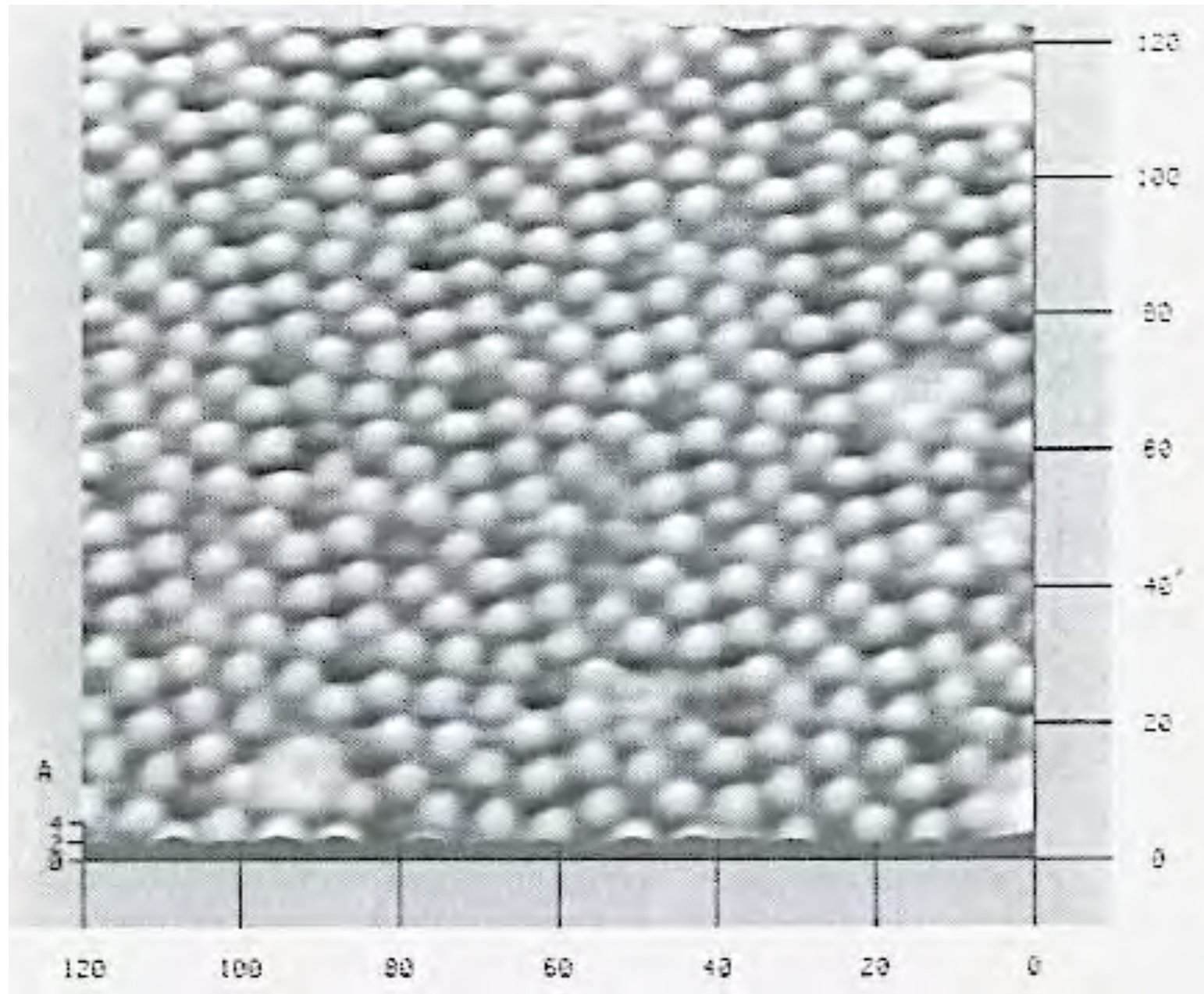
(g)

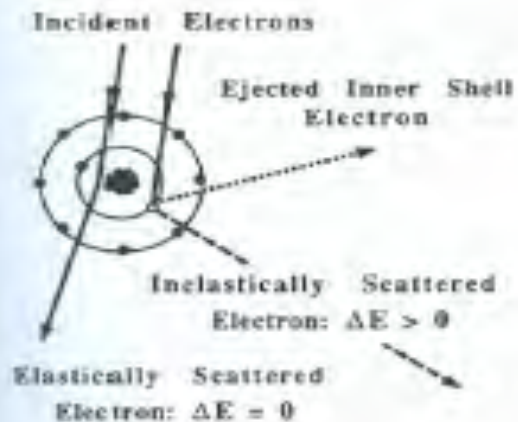


(h)



(i)





b

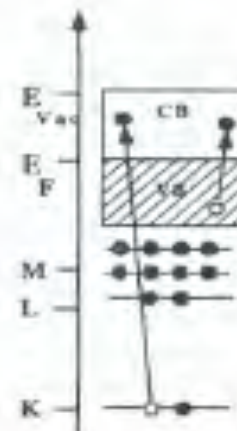
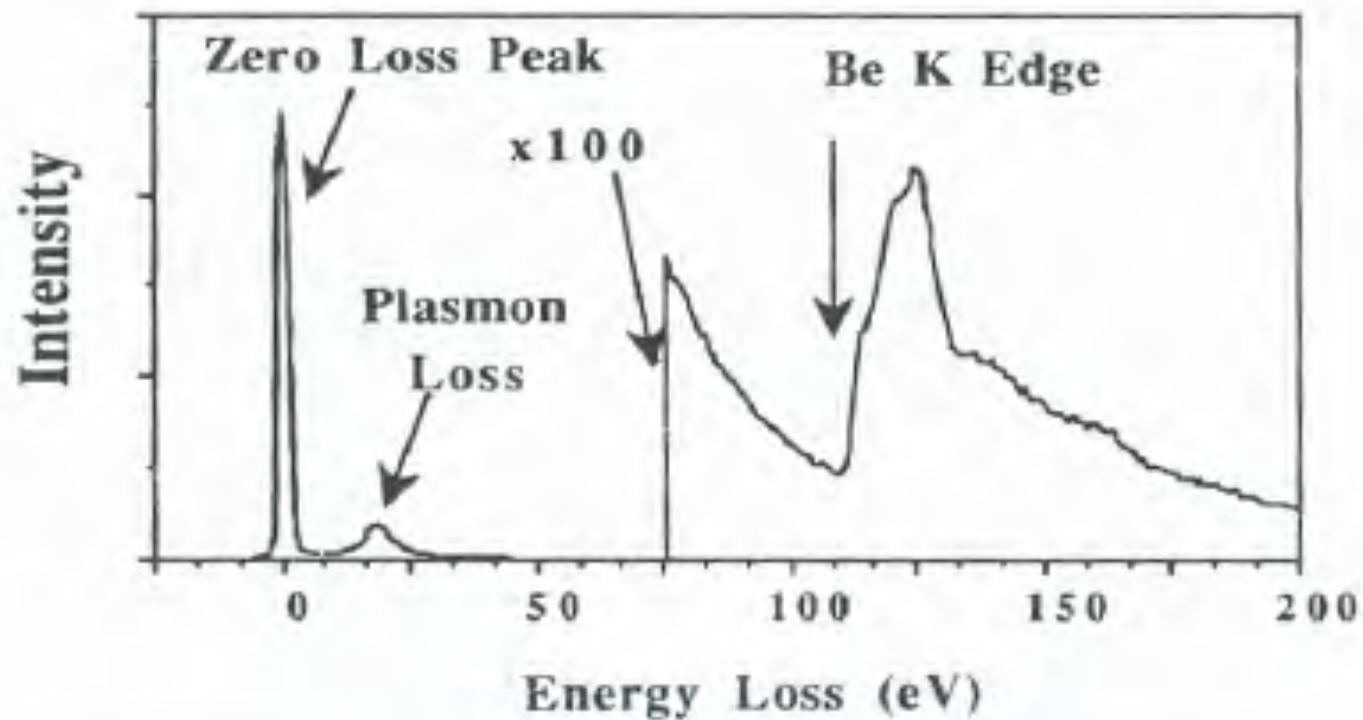
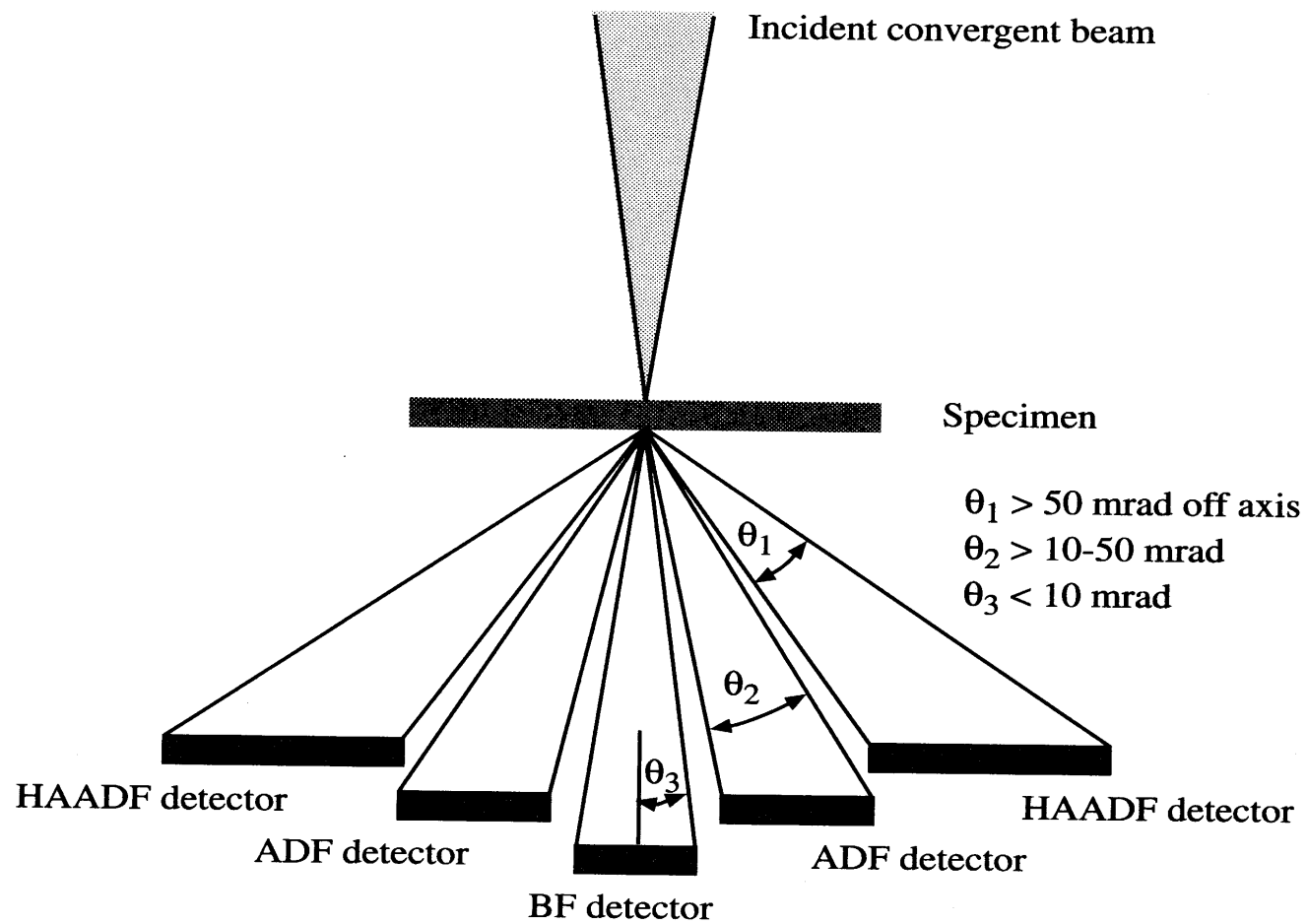


Figure 1 (a) Excitation of inner shells by Coulombic interactions. (b) Energy level diagram illustrating excitation from inner shell and valence band into the conduction band and the creation of a corresponding vacancy.

EELS mechanism



EELS



Effect of

