

3.63 For each peak, in order to compute the interplanar spacing and the lattice parameter we must employ Equations 3.14 and 3.13, respectively. The first peak of Figure 3.21, which results from diffraction by the (111) set of planes, occurs at $2\theta = 31.3^\circ$; the corresponding interplanar spacing for this set of planes, using Equation 3.13, is equal to

$$d_{111} = \frac{n\lambda}{2 \sin \theta} = \frac{(1)(0.1542 \text{ nm})}{(2) \left(\sin \frac{31.3^\circ}{2} \right)} = 0.2858 \text{ nm}$$

And, from Equation 3.14, the lattice parameter a is determined as

$$\begin{aligned} a &= d_{hkl} \sqrt{(h)^2 + (k)^2 + (l)^2} = d_{111} \sqrt{(1)^2 + (1)^2 + (1)^2} \\ &= (0.2858 \text{ nm}) \sqrt{3} = 0.4950 \text{ nm} \end{aligned}$$

Similar computations are made for the other peaks which results are tabulated below:

Peak Index	2θ	$d_{hkl}(\text{nm})$	$a \text{ (nm)}$
200	36.6	0.2455	0.4910
220	52.6	0.1740	0.4921
311	62.5	0.1486	0.4929
222	65.5	0.1425	0.4936