Properties of Materials
Home Work 1 (Due: 09/27/2010)

1. A crystal has one atom per lattice point and a set of primitive translation vectors are (in Å):

a = 3i, b = 3j, c = 1.5(i+j+k)

where i,j,k are the unit vectors on x,y,z direction. What is lattice type of this crystal? Calculate volume of conventional and primitive unit cell. (20)

2. Write all directions from the family <110> and <111>. (20)

3. Calculate the angle between the following directions in a cubic crystal:

(a) [111] and [001] (10)

(b) [111] and  (10)

4. Determince Miller indices of planes that makes intercepts:

(a) of 2Å, 3Å, 4Å on the coordinate axes of orthorhombic crystal. (10)

(b) on a,b and c, axes equal to 3Å, 4Å and 3Å in a tetragonal crystal with c/a as 1.5. (10)

5. The distance between consecutive (111) planes in a cubic crystal is 2 Å. Determine lattice parameter and volume of unit cell. (10)

6. Calculate interplanar spacing for (321) plane in a simple cubic lattice with interatomic spacing a = 4.21 Å. (10)