**Material Properties Science**

**Homework #4**

**Due date：11/16/ 2016**

1. Determine the expected diffraction angle for the first-order reflection from the (310) set of planes for BCC chromium when monochromatic radiation of wavelength 0.0711 nm is used.

2. Figure 3.21 shows an x-ray diffraction pattern for lead taken using a diffractometer and monochromatic x-radiation having a wavelength of 0.1542 nm; each diffraction peak on the pattern has been indexed. Compute the interplanar spacing for each set of planes indexed; also determine the lattice parameter of Pb for each of the peaks.




1. Figure 3.24 shows the first five peaks of the x-ray diffraction pattern for tungsten, which has a BCC crystal structure; monochromatic x-radiation having a wavelength of 0.1542 nm was used.
	1. Index (i.e., give h, k, and l indices) for each of these peaks.
	2. Determine the interplanar spacing for each of the peaks.
	3. For each peak, determine the atomic radius for W and compare these with the value presented in Table 3.1.




4. (a) Derive linear density expressions for FCC [100] and [111] directions in terms of the atomic radius R.

 (b) Compute and compare linear density values for these same two planes for copper.





5. (a) Derive planar density expressions for FCC (100) and (111) planes in terms of the atomic radius R.

 (b) Compute and compare planar density values for these same two planes for aluminum.



