CHAPTER 4

4.40 *(a) For a given material, would you expect the surface energy to be greater than, the same as, or less than the grain boundary energy? Why?*

(b) The grain boundary energy of a small-angle grain boundary is less than for a high-angle one. Why is this so?

4.46 *Determine the ASTM grain size number if 25 grains per square inch are measured at a magnification of 600×.*

4.D1 *Aluminum–lithium (Al-Li) alloys have been developed by the aircraft industry to reduce the weight and improve the performance of its aircraft. A commercial aircraft skin material having a density of 2.55 g/cm^3 is desired. Compute the concentration of Li (in wt%) that is required.*

4.D2 *Iron (Fe) and vanadium (V) both have the BCC crystal structure, and V forms a substitutional solid solution for concentrations up to approximately 20 wt% V at room temperature. Determine the concentration in weight percent of V that must be added to Fe to yield a unit cell edge length of 0.289 nm.*