Materials 218/UCSB: Assignment I

Ram Seshadri (seshadri@mrl.ucsb.edu)

Remember Kim likes short answers !

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1. Most metals are good thermal conductors, and most insulators are poor thermal conductors. Why then do most graphite samples have poor thermal conductivity while diamond is a very good thermal conductor.

2. Why do you think systems with Li ions might make better battery materials than systems with Na ions ? (Na is cheaper than Li !).

3. Distinguish between a glass former and a glass modifier. In the system SiO_2/Na_2O, which is which ?

4. One way of making nanoparticles is to prevent crystals from growing in size through the use of surfactants (capping agents). Can you suggest at least one other method.

5. Why does NaCl take up the CsCl structure when subject to high hydrostatic pressure ?

6. Water and silicon share a common feature in that when they melt, their densities increase (at least at 1 bar pressure). Provide a simple structural reason. What do you think silica would do ? What about FCC Cu ?

7. What is the Kauzmann paradox ?

8. It is not possible to tile a flat surface with only pentagons. What if the surface were curved (such as a sphere) ?