Quiz Spinodal Decomposition

1) Write the Flory-Huggins equation and explain its origin in terms of ideal mixing and the enthalpy of interaction. What parts of the equation relate to enthalpy and what relate to entropy.

2) Explain the difference between the Gibbs free energy and the Helmholtz free energy. Which is calculated in the FH expression?

3) Sketch the Flory Huggins equation versus composition for various values of χ showing how it is used to determine a phase diagram. This is a plot of free energy versus composition at different temperatures ($\chi = z\Delta\varepsilon/(kT)$). (*Use the graphs shown in the notes for this lab.*)

3) Sketch an LCST phase diagram for a polymer blend (Temperature versus Composition). Explain in words how phase separation could occur on heating. Include the bionodal and spinodal curves and label the critical point.

4) How are the binodal, spinodal, and critical points related to the FH equation. (*This is in the web notes*).

5) Sketch the structure that is formed in the spinodal regime at early stages of phase separation.

6) Make a similar sketch for the binodal regime.

7) What happens during Ostwald ripening of the two structures in questions 5 and 6 at late stages of phase separation?