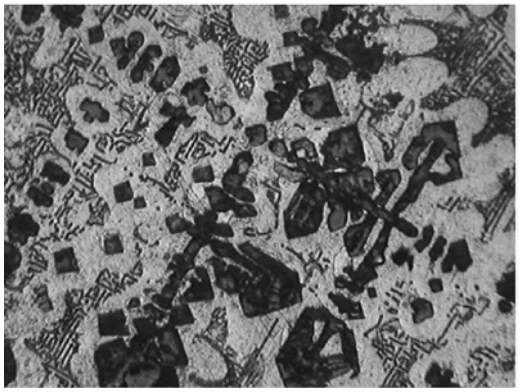
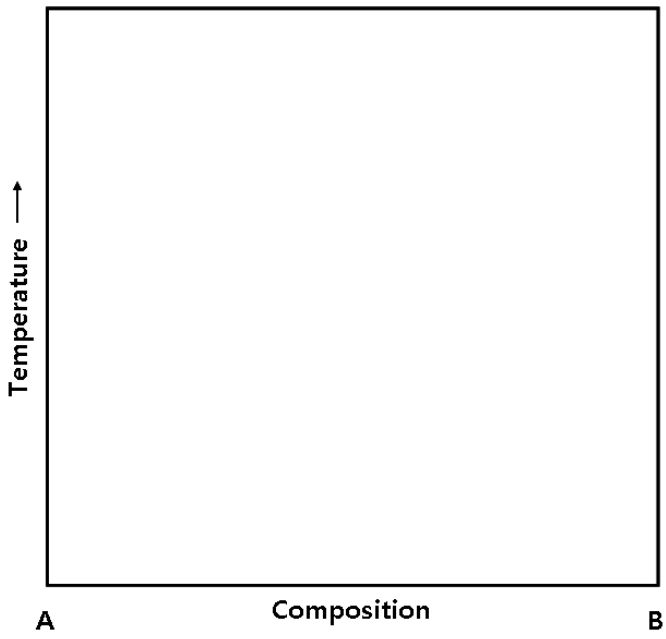
Advanced Solidification

2018 Fall Quiz **09. 04. 2018**

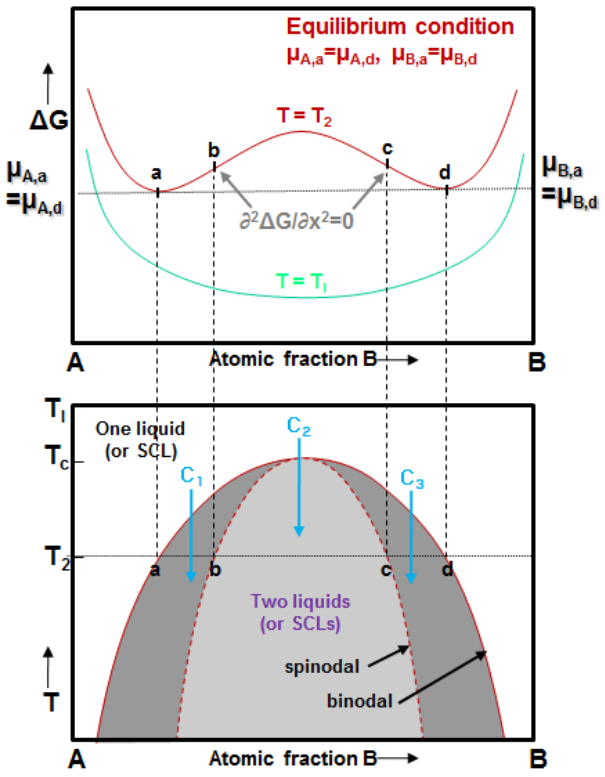
PIN # **Class #** **Name:**

1. The heat of mixing between Mg (HCP, T_m=922 K) and Si (FCC, T_m=1683 K) is -34 kJ/g-at solute. And following photo is the optical micrograph of the microstructure of Mg-8 wt.%Si alloy. The solidified microstructure of the alloy contains three constituents: the dark phase is surrounded by a white phase and then by poly-phase structure. On the basis of this information, draw carefully a schematic Mg-Si binary phase diagram. (5 points)

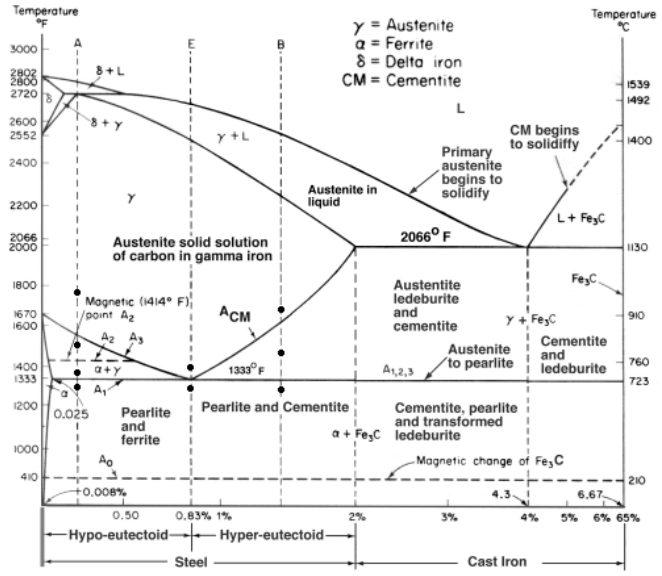




2. With reference to following figure, consider three alloys having compositions, (1) C1, (2) C2 and (3) C3, respectively. Draw schematically final microstructures and explain the course of solidification of each of these alloys upon cooling. (5 points)



3. (a) Draw schematic microstructure just after invariant reaction around 2720°F and explain the microstructural characteristic after finishing this invariant reaction by natural freezing. (5 points)



(b) α, ferrite is more stable than γ, Austenite below transformation temperature (1185 K). However, γ, Austenite can be more stable than α, ferrite at high pressure even below transformation temperature (1185 K). How can you explain this? (5 points)