所別：光電科學研究所碩士班 不分組 科目：材料工程

(15) 1. Draw and compare the stress-strain behaviors for brittle, moderate ductile, high ductile, and tough materials. And, also point out the properties one can get from the stress-strain curves for all the materials mentioned as above.

(10) 2. Sodium Chloride has a FCC structure as shown in Figure 1. The ionic radii are R(Na) = 0.97 Å and R(Cl) = 1.81 Å. Please determine the packing factor and the density of NaCl.

(10) 3. Draw the curve to explain the thermal stability of glasses; and point out the stress-release temperature, the glass transition temperature, and the melting point of glasses.

(15) 4. Under the equilibrium conditions, calculate the amount of solid in a SiO_2 –10% Na_2O mixture at 1600℃, 1400℃, 1200℃, 1000℃, and 800℃. The Phase diagram is shown in Figure 2.

Fig. 1

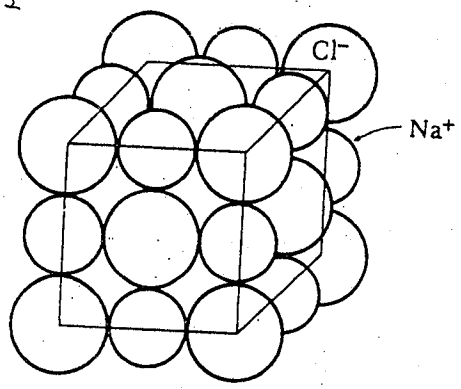
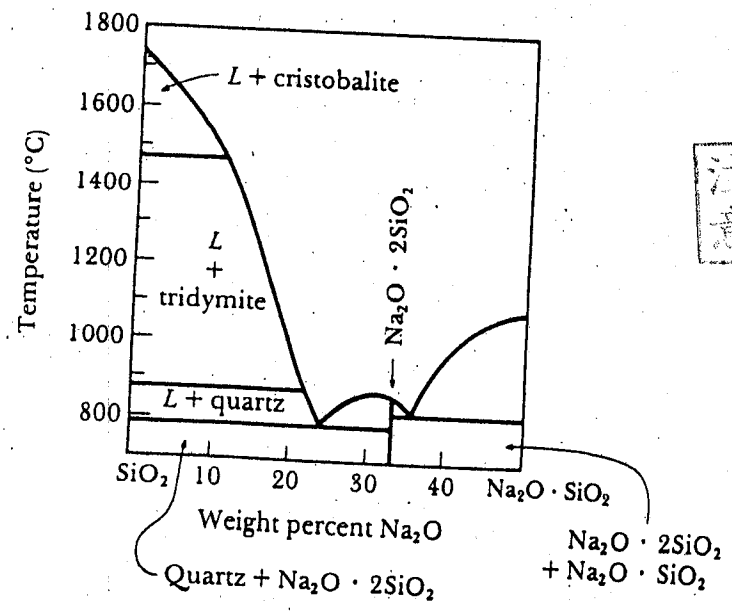


Fig. 2



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5. (10%)
Crystal System 分類可分為 7 大類，其中有 cubic, tetragonal.....等，請寫出及畫出其它 5 種，並說明分類上的差異。

6. (15%)
請在 cubic system 中分別畫出兩個[110]，[210]平面，在最近的兩平面的距離為何? 何種實驗可用來測量這距離，請描述之。

7. (15%)
市面上的發光二極体是由什麼材料作成，它的發光機制是什麼？為什麼矽晶不容易發光?又導電塑膠的導電機制是什麼？

8. (10%)
解釋 edge dislocation 及 screw dislocation。