Simple peritectic

L + A -> B

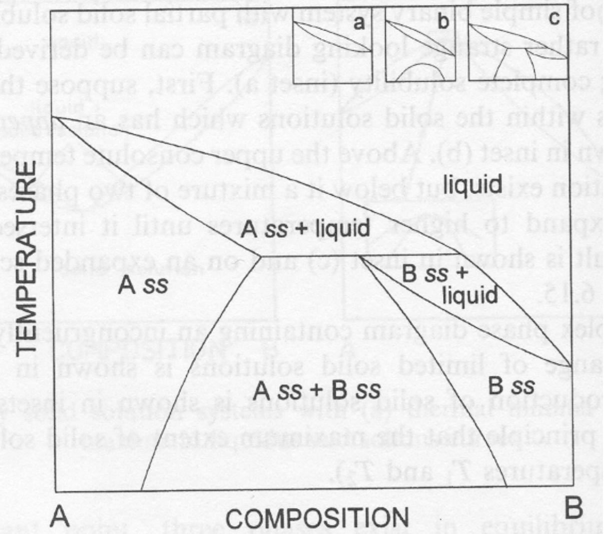


Fig. 6.15 Binary system with partial solid solution formation

Simple peritectic

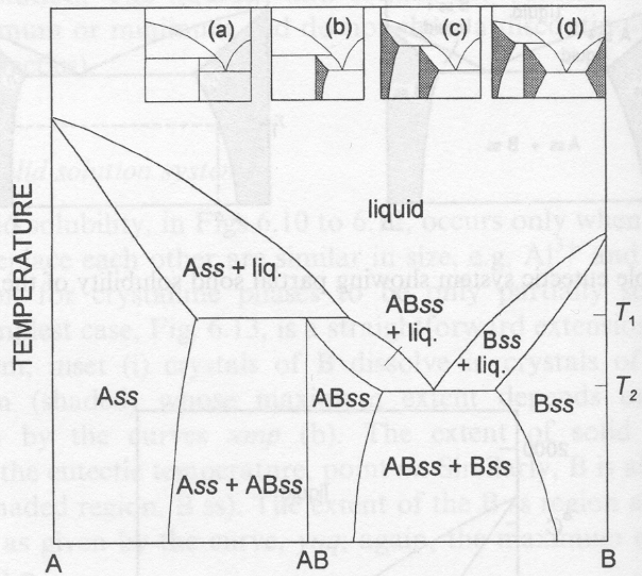


Fig. 6.16 Binary system with incongruently melting compound and partial solid solution formation

Simple peritectic

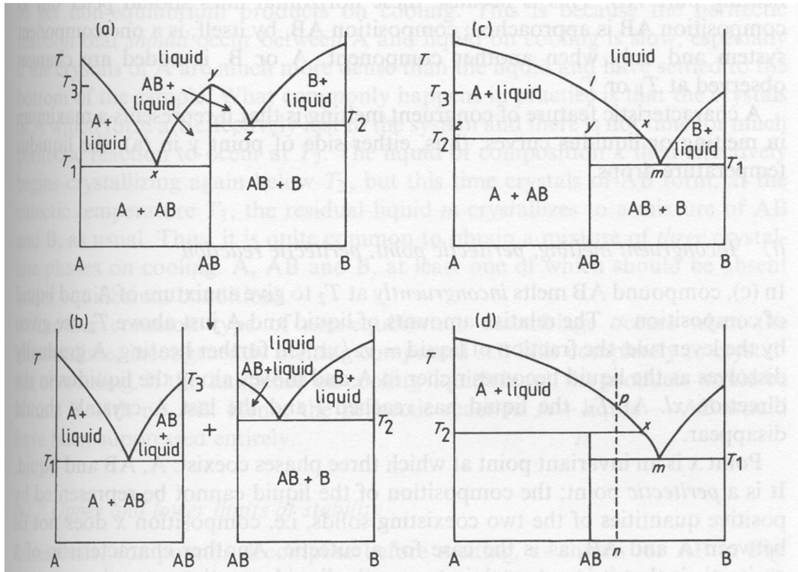


Fig. 6.8 Binary systems showing a compound AB melting congruently (a) and incongruently (c), (d). In (b), the diagram in (a) is separated into two self-contained, simple eutectic systems

Simple peritectic

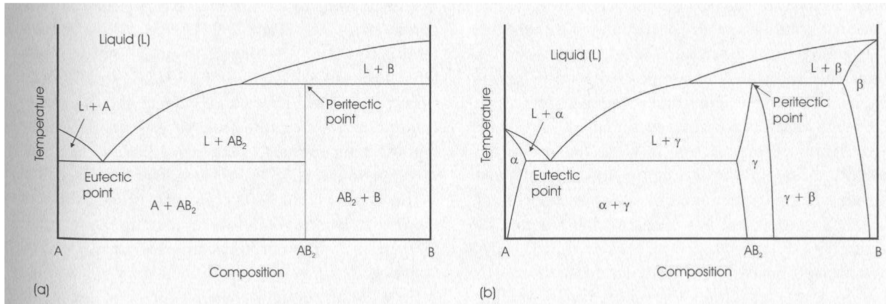


Figure 4.15 (a) A hypothetical ceramic (nonmetallic) phase diagram containing a peritectic point and (b) a hypothetical metallurgical phase diagram containing a peritectic point

Lever rule

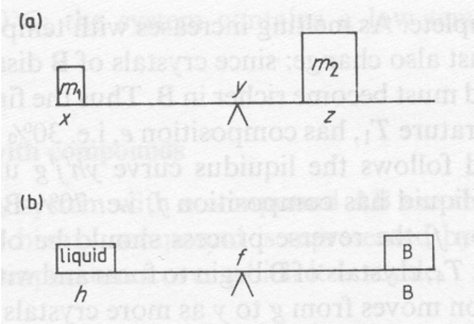
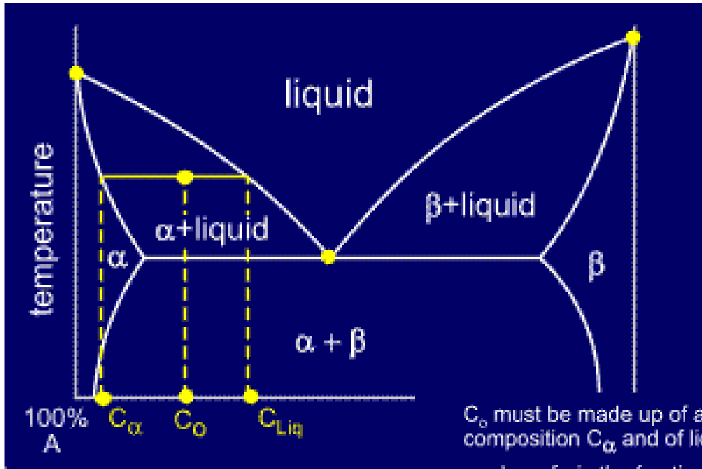


Fig. 6.7 Principle of moments



C_o must be made up of appropriate amounts of α at composition C_α and of liquid at composition C_{Liq}.

where f_α is the fraction of α in the sample:

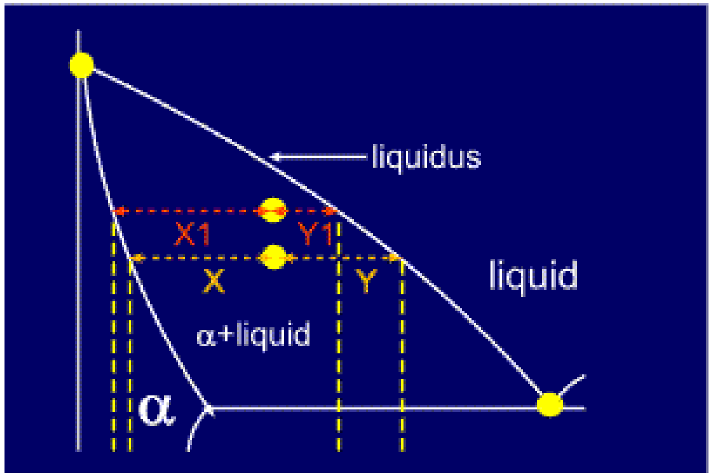
$$C_o = f_\alpha C_\alpha + (1 - f_\alpha) C_{Liq}$$

and by rearranging:

$$C_o - C_{Liq} = f_\alpha (C_\alpha - C_{Liq})$$

and finally:

$$f_\alpha = \frac{C_o - C_{Liq}}{C_\alpha - C_{Liq}}$$



Demixing

L -> L' + L"

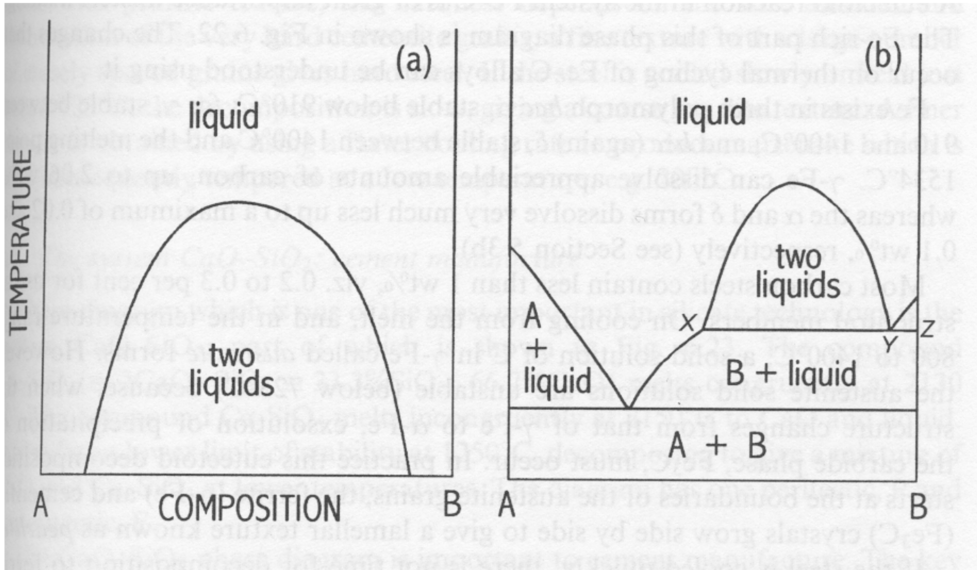


Fig. 6.20 Liquid immiscibility domes in phase diagrams

Demixing

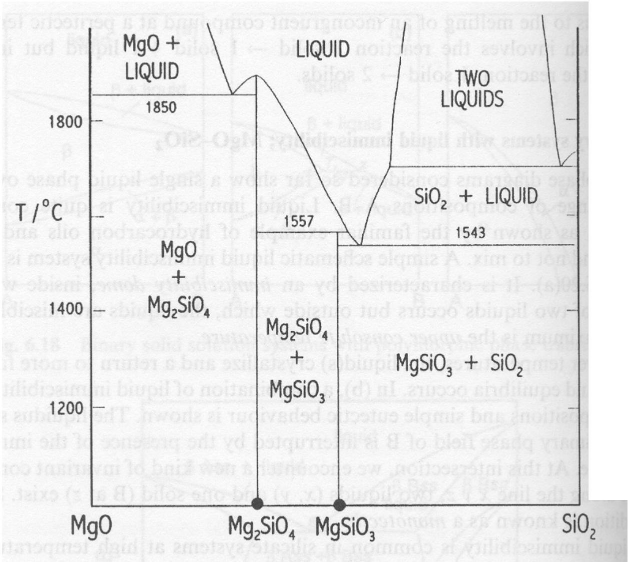
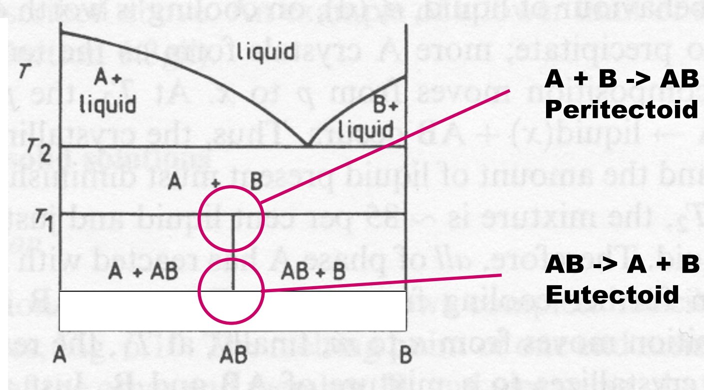


Fig. 6.21 Phase diagram $MgO–SiO_2$

-oid



Binary system showing compound AB with an upper limit of stability

Polymorphs

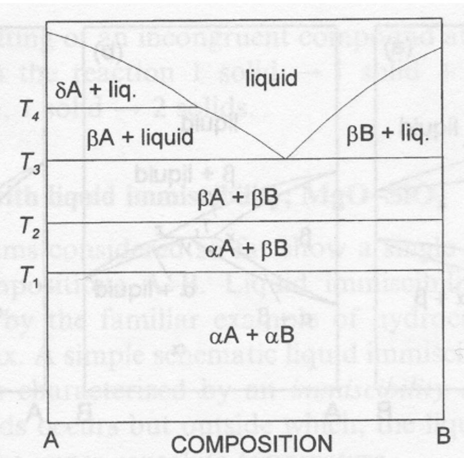


Fig. 6.17 Simple eutectic system with solid–solid phase transitions

Polymorphs

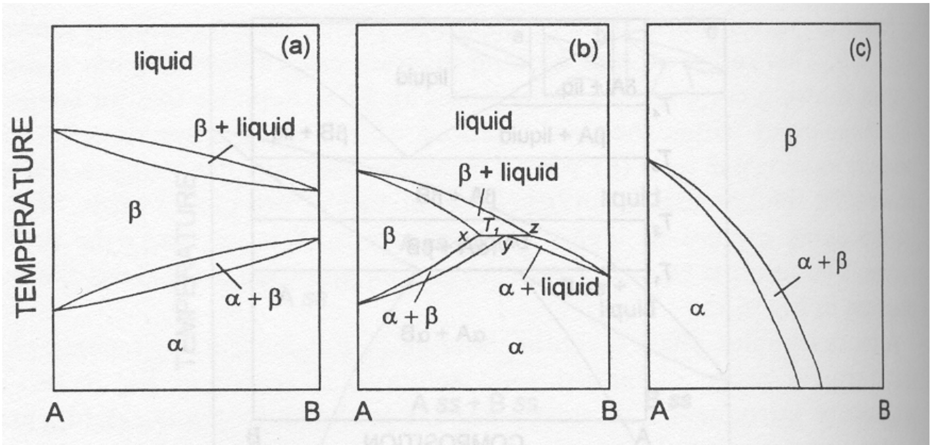


Fig. 6.18 Binary solid solution systems with polymorphic phase transitions

Polymorphs

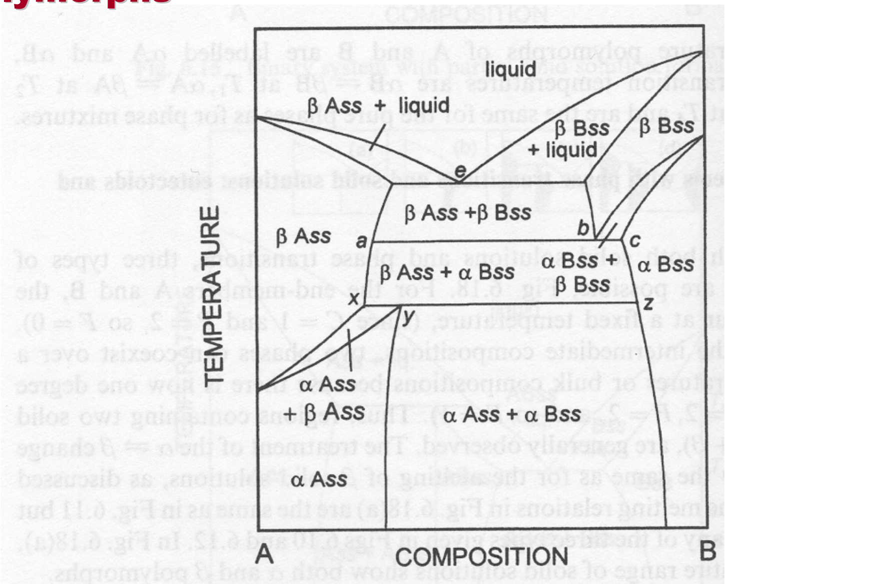
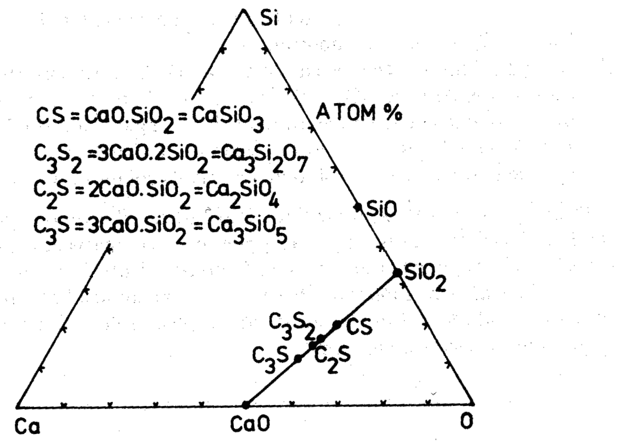


Fig. 6.19 Binary eutectic system with polymorphic transitions and partial solid solution formation

Terneary diagrams



6.1 Binary join CaO–SiO$_2$ in the ternary system Ca–Si–O. Note the method used the labelling of phases, C=CaO, etc. This type of abbreviation is widely used in oxide chemistry

Important phase diagrams

Fe-C

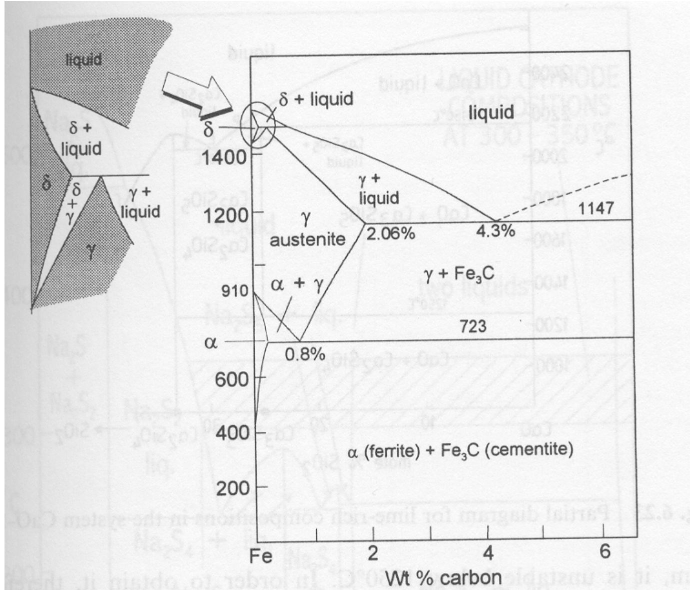
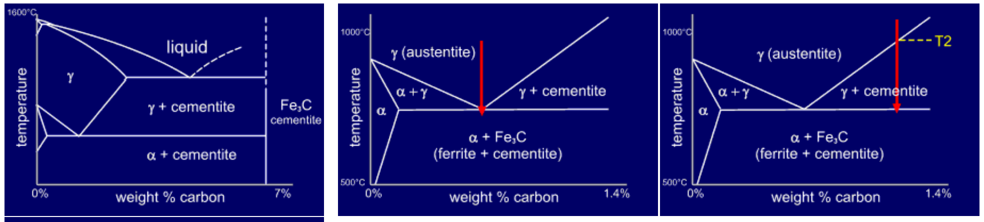
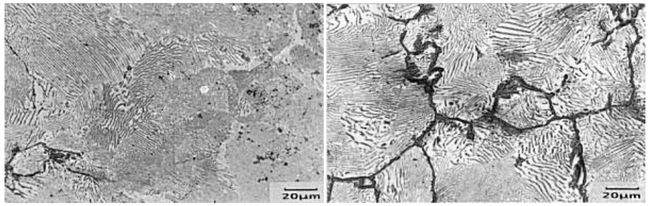


Fig. 6.22 The Fe–C diagram

Fe-C





0.83

1.3

CaO-SiO$_2$

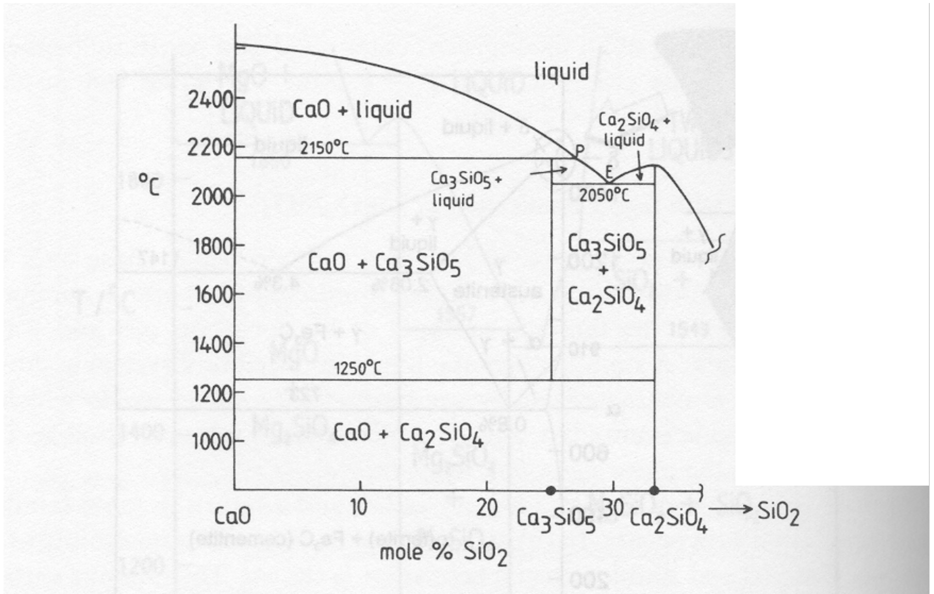


Fig. 6.23 Partial diagram for lime-rich compositions in the system CaO–SiO$_2$

Na$_2$O-SiO$_2$

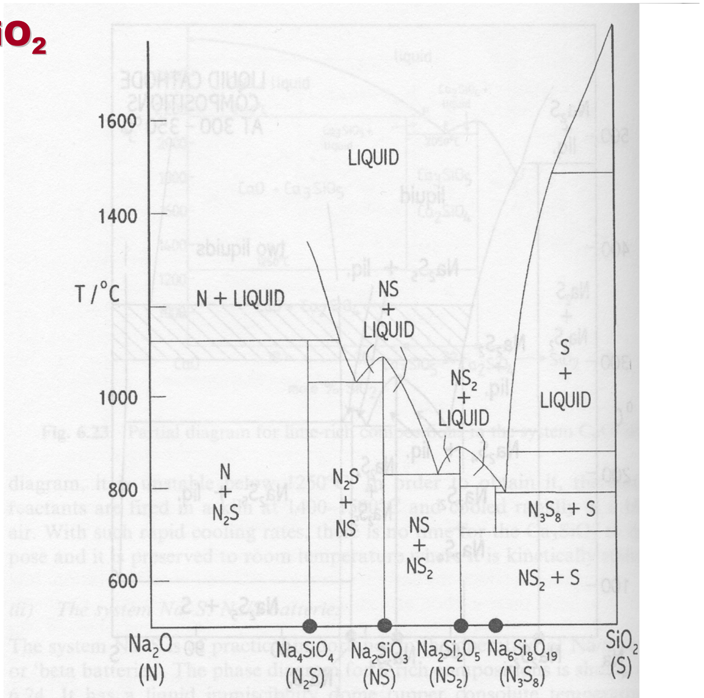


Fig. 6.25 Phase diagram Na$_2$O–SiO$_2$: N = Na$_2$O, S = SiO$_2$, N$_2$S = Na$_4$SiO$_4$, NS = Na$_2$SiO$_3$, NS$_2$ = Na$_2$Si$_2$O$_5$ N$_3$S$_8$ = Na$_6$Si$_8$O$_{19}$

Li$_2$SiO$_3$ – SiO$_2$

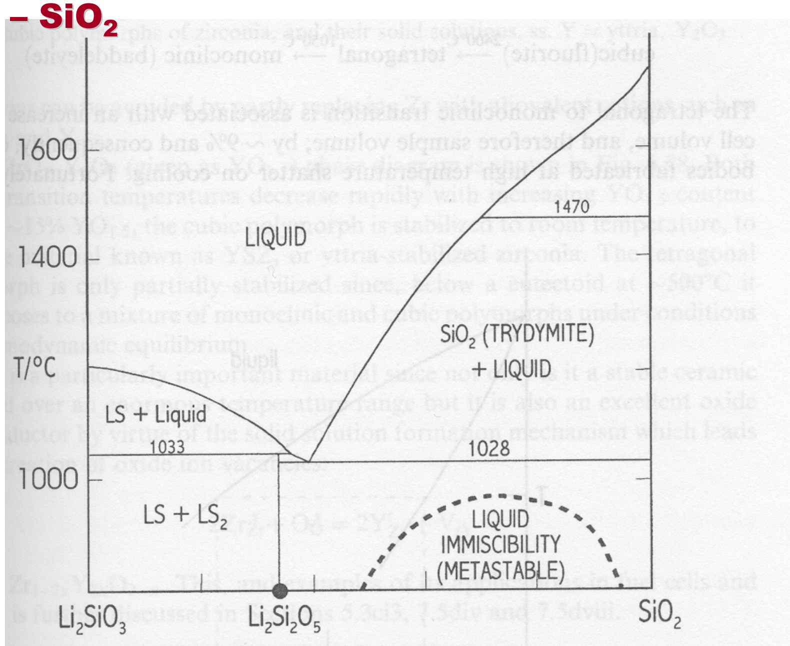


Fig. 6.26 Phase diagram Li$_2$SiO$_3$–SiO$_2$. LS = Li$_2$SiO$_3$, LS$_2$ = Li$_2$Si$_2$O$_5$. The existence of a metastable immiscibility dome in rapidly-cooled liquids that have avoided crystallization is shown schematically, dashed

Na-S

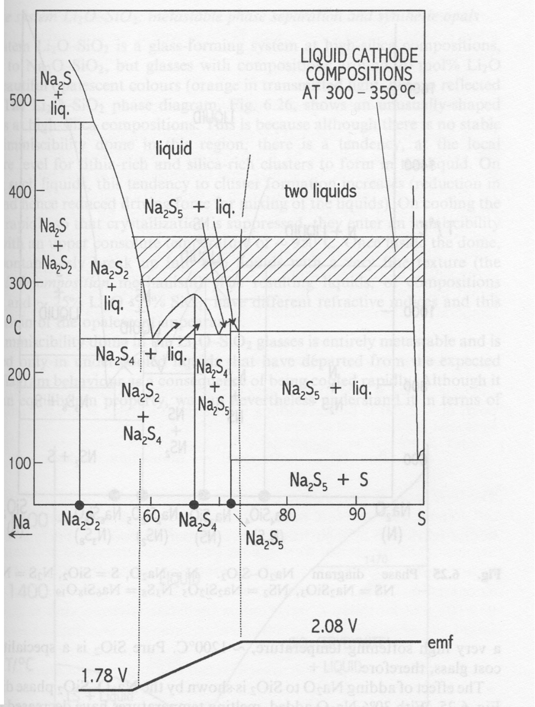


Fig. 6.24 Na–S phase diagram and open circuit cell voltage as a function of degree of discharge/cathode composition for the Na/S cell

$ZrO_2 – Y_2O_3$

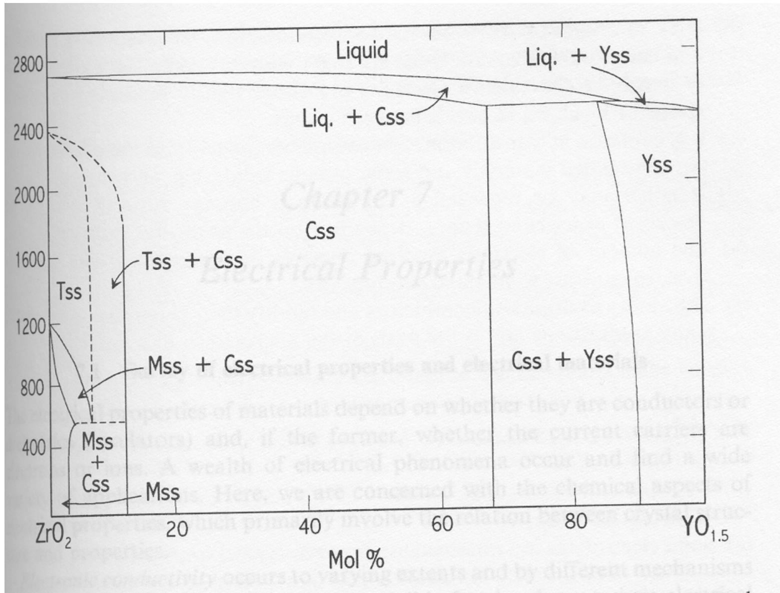
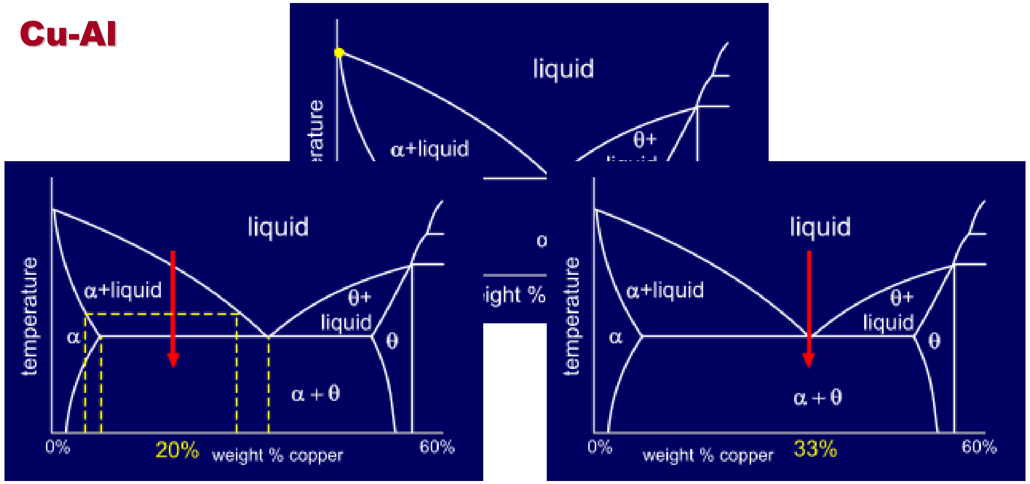
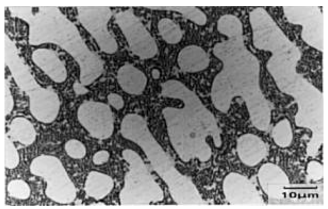
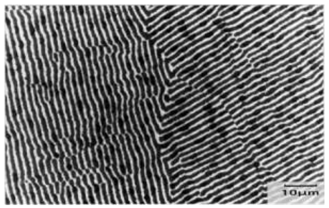


Fig. 6.28 Phase diagram ZrO_2–Y_2O_3. M, T and C refer to the monclinic, tetragonal and cubic polymorphs of zirconia, and their solid solutions, ss. Y = yttria, Y_2O_3

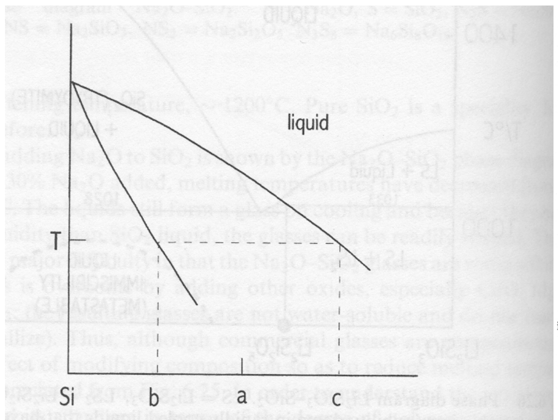
Cu-Al







Zone refinement



Purification of Si by zone refining: impurities concentrate in melt

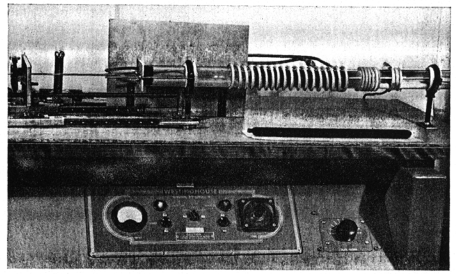


Figure 3.8. Apparatus used to grow zone-leveled single crystals of germanium. (*After Bennett and Sawyer.*[37])

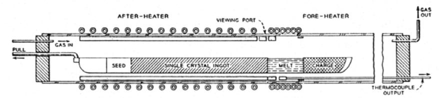


Figure 3.9. Diagram of furnace section of the zone-leveling crystal grower shown in Figure 3.8. (*After Bennett and Sawyer.*[37])

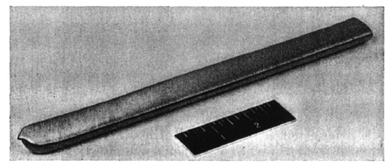


Figure 3.10. A zone-leveled single crystal prepared in the apparatus of Figures 3.8 and 3.9. The scale is in inches.