

铁碳合金的组元及基本相

δ - Fe \longrightarrow γ - Fe \longrightarrow α - Fe

体心

面心

体心

铁素体

奥氏体

铁素体

渗碳体：Fe₃C和C形成的间隙

铁碳相图

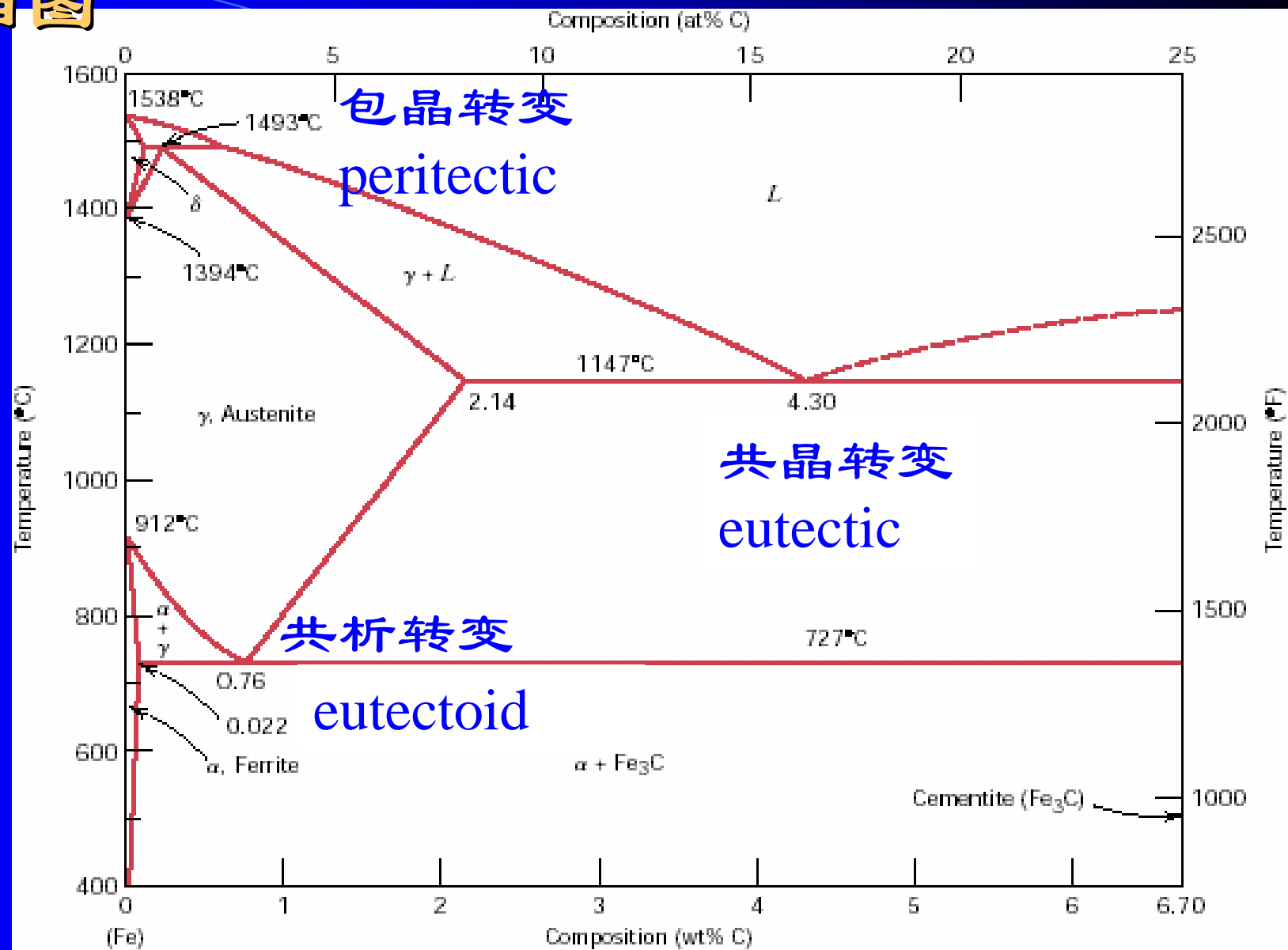


FIGURE 10.26 The iron-iron carbide phase diagram. (Adapted from *Binary Alloy Phase Diagrams*, 2nd edition, Vol. 1, T. B. Massalski, Editor-in-Chief, 1990. Reprinted by permission of ASM International, Materials Park, OH.)

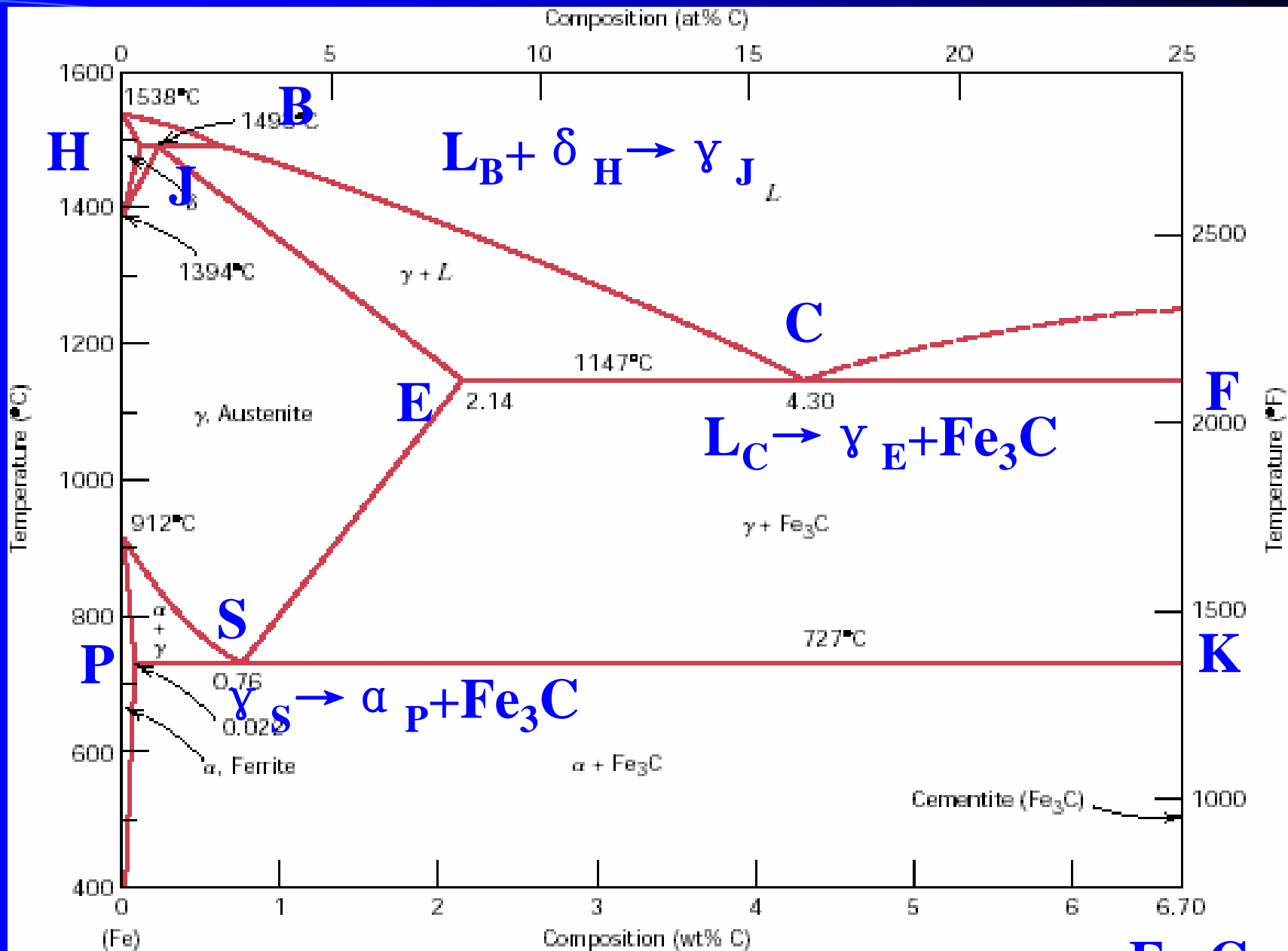


FIGURE 10.26 The iron-iron carbide phase diagram. (Adapted from *Binary Alloy Phase Diagrams*, 2nd edition, Vol. 1, T. B. Massalski, Editor-in-Chief, 1990. Reprinted by permission of ASM International, Materials Park, OH.)

Fe₃C

铁碳合金

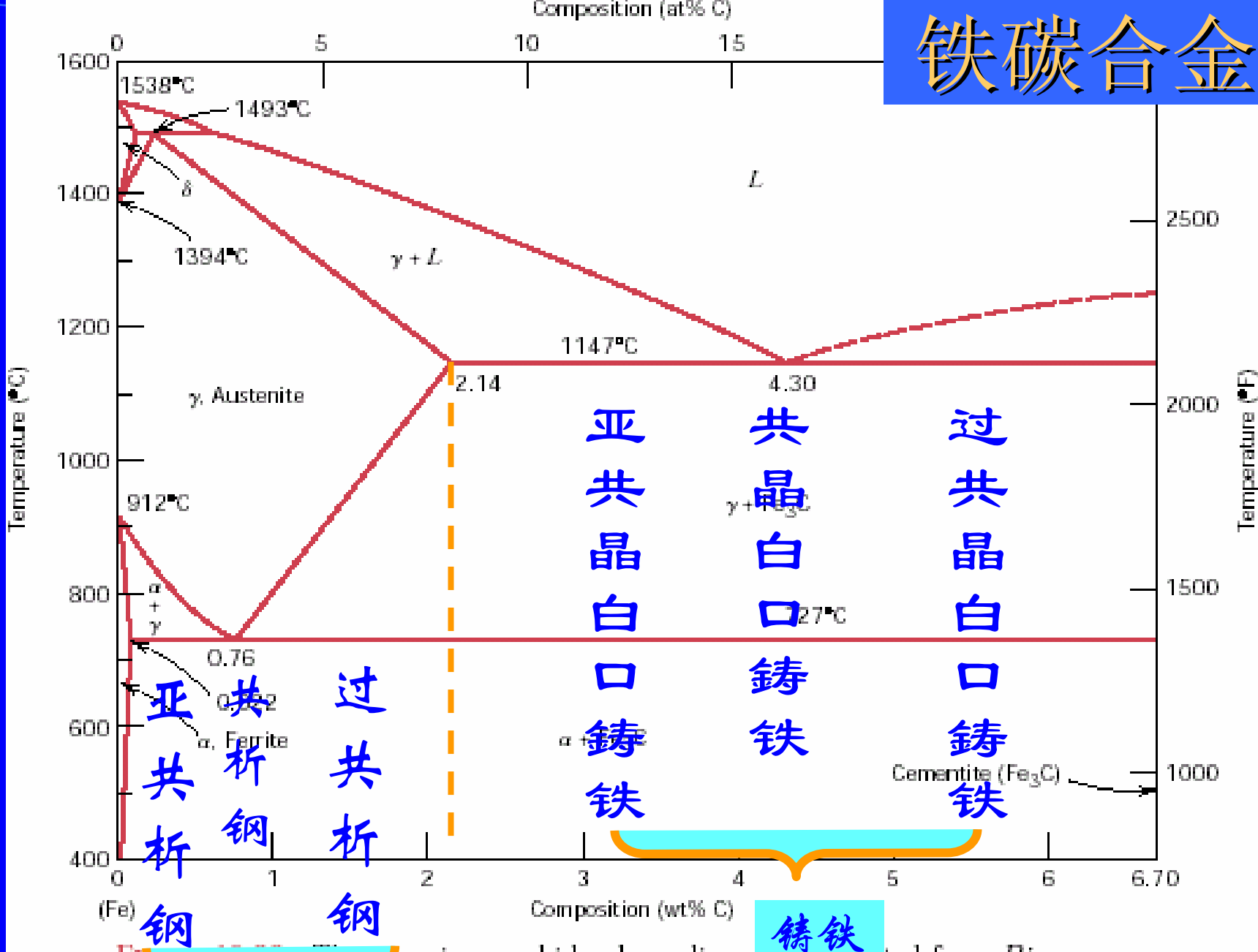


Figure 9.1 Iron-iron carbide phase diagram (adapted from *Binary Alloy Phase Diagrams*, 2nd edition, Vol. 1, T. B. Massalski, Editor-in-Chief, 1990. Reprinted by permission of ASM International, Materials Park, OH.)

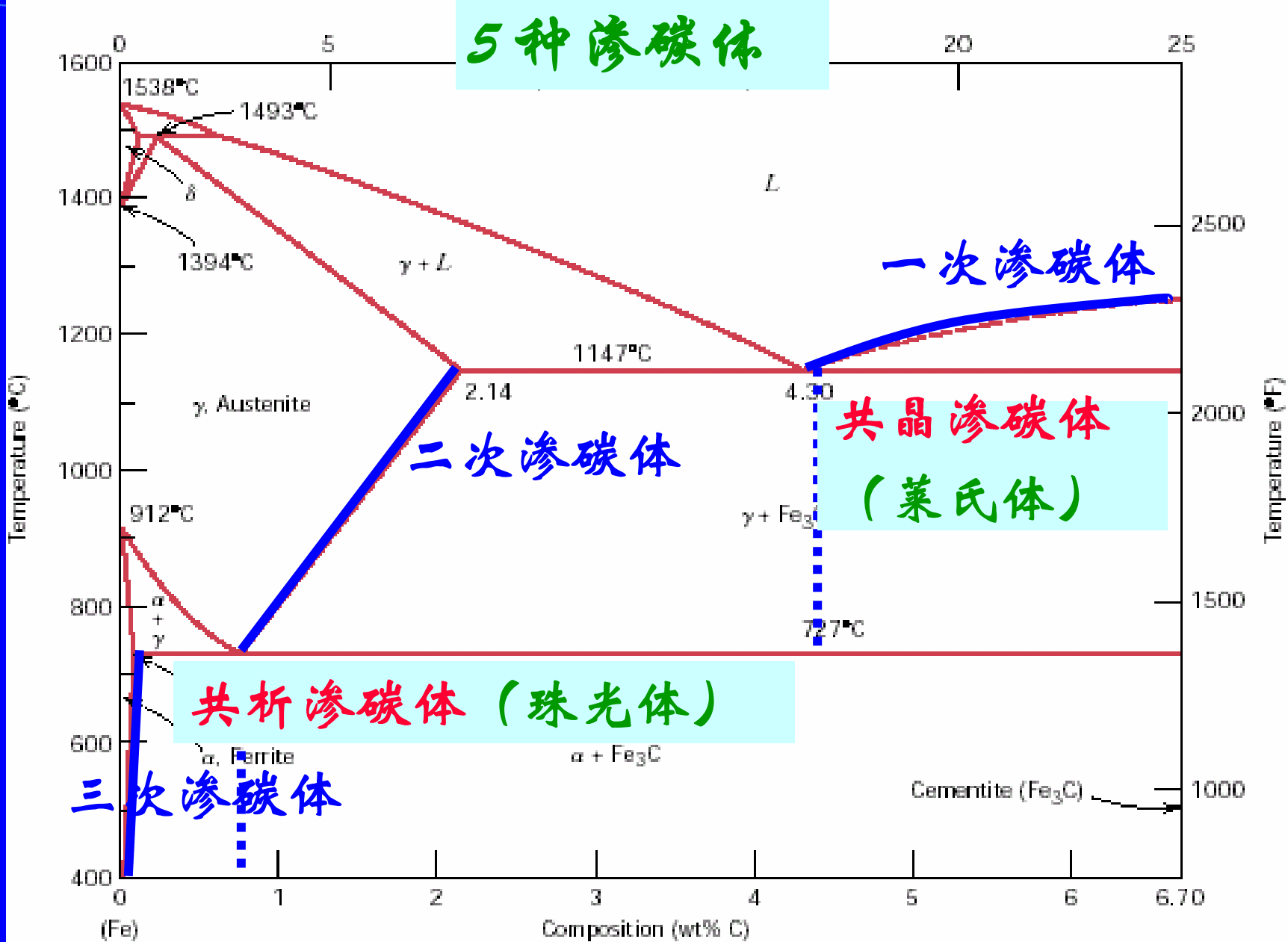


FIGURE 10.26 The iron-iron carbide phase diagram. (Adapted from *Binary Alloy Phase Diagrams*, 2nd edition, Vol. 1, T. B. Massalski, Editor-in-Chief, 1990. Reprinted by permission of ASM International, Materials Park, OH.)

(2) 共析钢

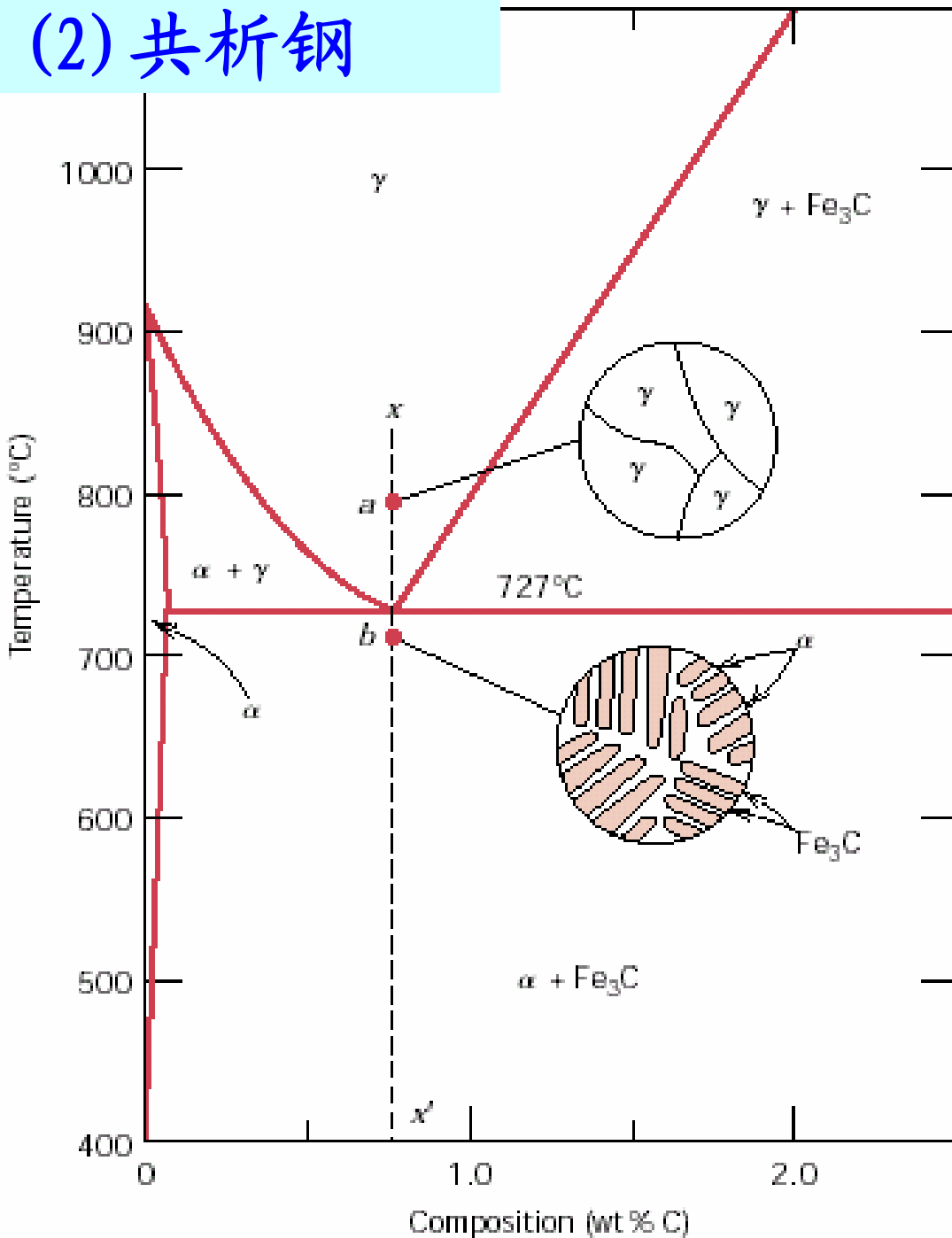


FIGURE 10.28 Schematic representations of the microstructures for an iron-carbon alloy of eutectoid composition (0.76 wt% C) above and below the eutectoid temperature.

珠光体

铁碳合金共析转变的产物，是共析铁素体和共析渗碳体的层片状混合物。

从奥氏体中形成珠光体，箭头表示碳扩散方向

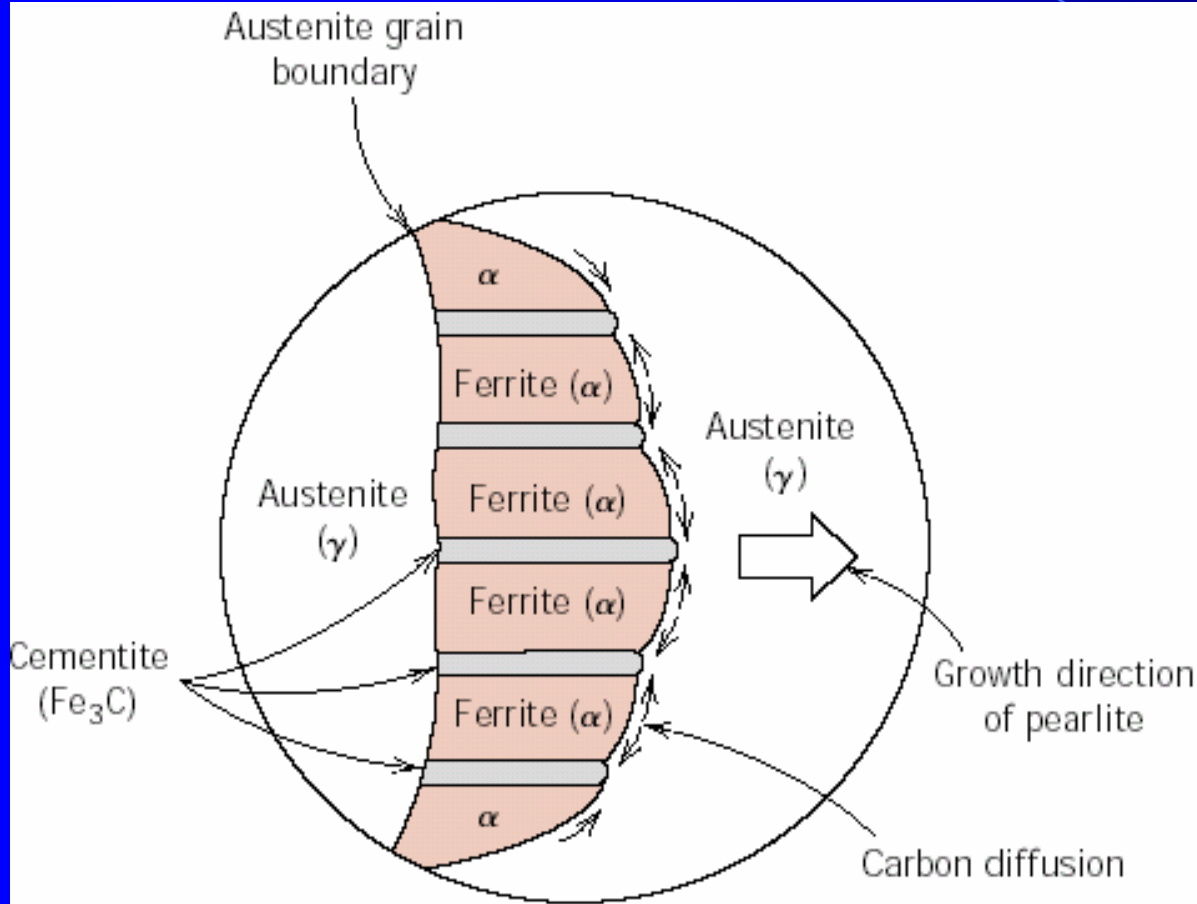


FIGURE 10.30 Schematic representation of the formation of pearlite from austenite; direction of carbon diffusion indicated by arrows.

珠光体：亮 α Fe 铁素体
pearlite ferrite

黑长条 Fe_3C
cementite

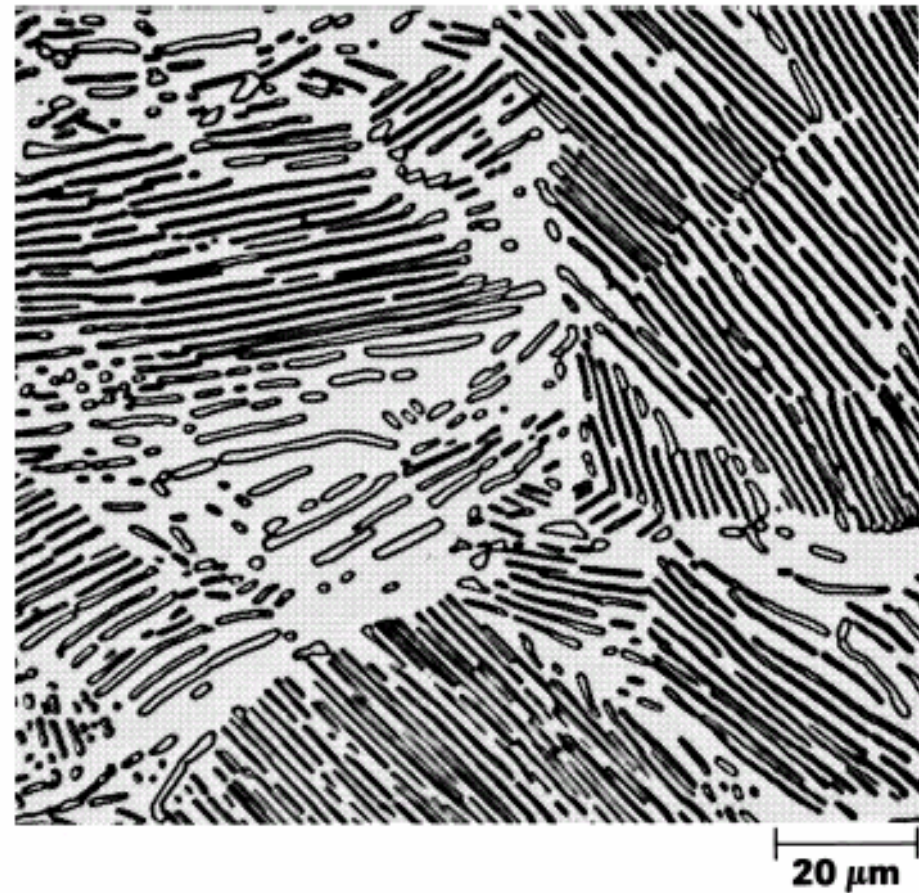


FIGURE 10.29 Photomicrograph of a eutectoid steel showing the pearlite microstructure consisting of alternating layers of α ferrite (the light phase) and Fe_3C (thin layers most of which appear dark). 500 \times . (Reproduced with permission from *Metals Handbook*, Vol. 9, 9th edition, *Metallography and Microstructures*, American Society for Metals, Materials Park, OH, 1985.)

(3) 亚共析钢

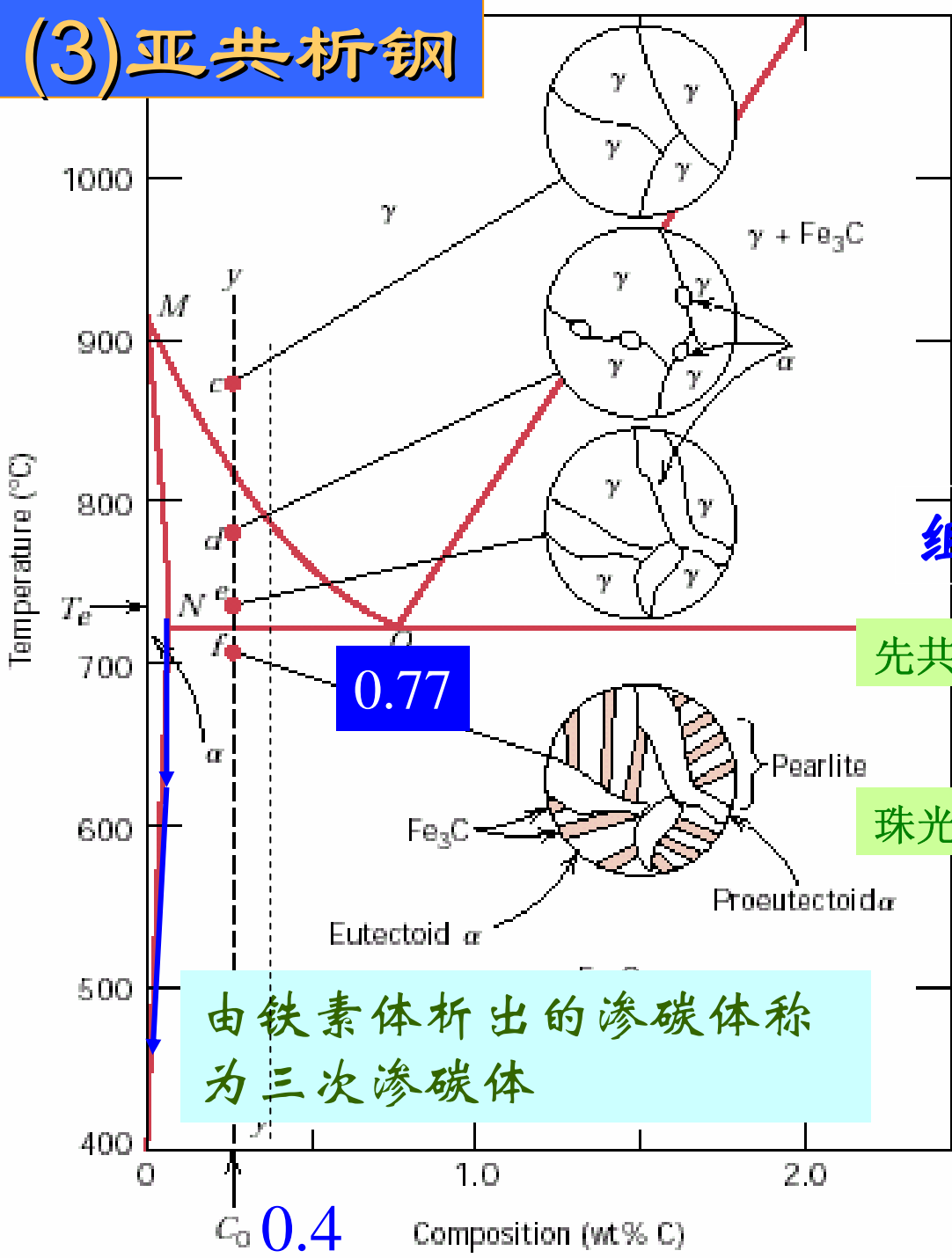


FIGURE 10.31 Schematic representations of the microstructures for an iron-carbon alloy of hypoeutectoid composition C_0 (containing less than 0.76 wt% C) as it is cooled from within the austenite phase region to below the eutectoid temperature.

组织组成

先共析铁素体

$$W(\alpha) = \frac{0.77 - 0.40}{0.77 - 0.218} = 49.5\%$$

珠光体

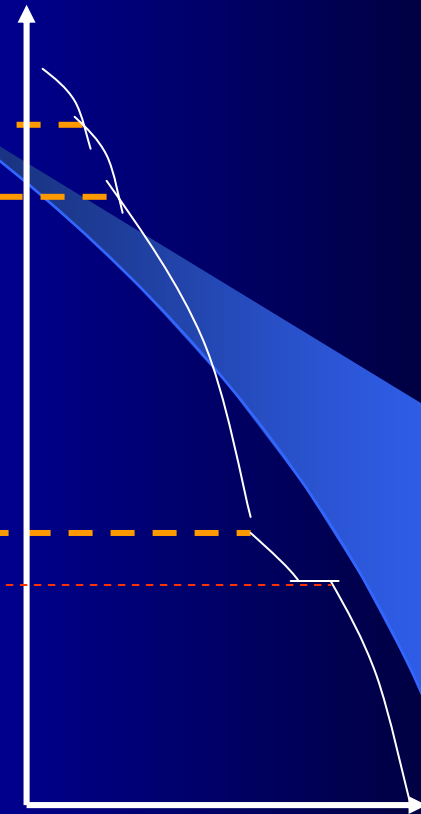
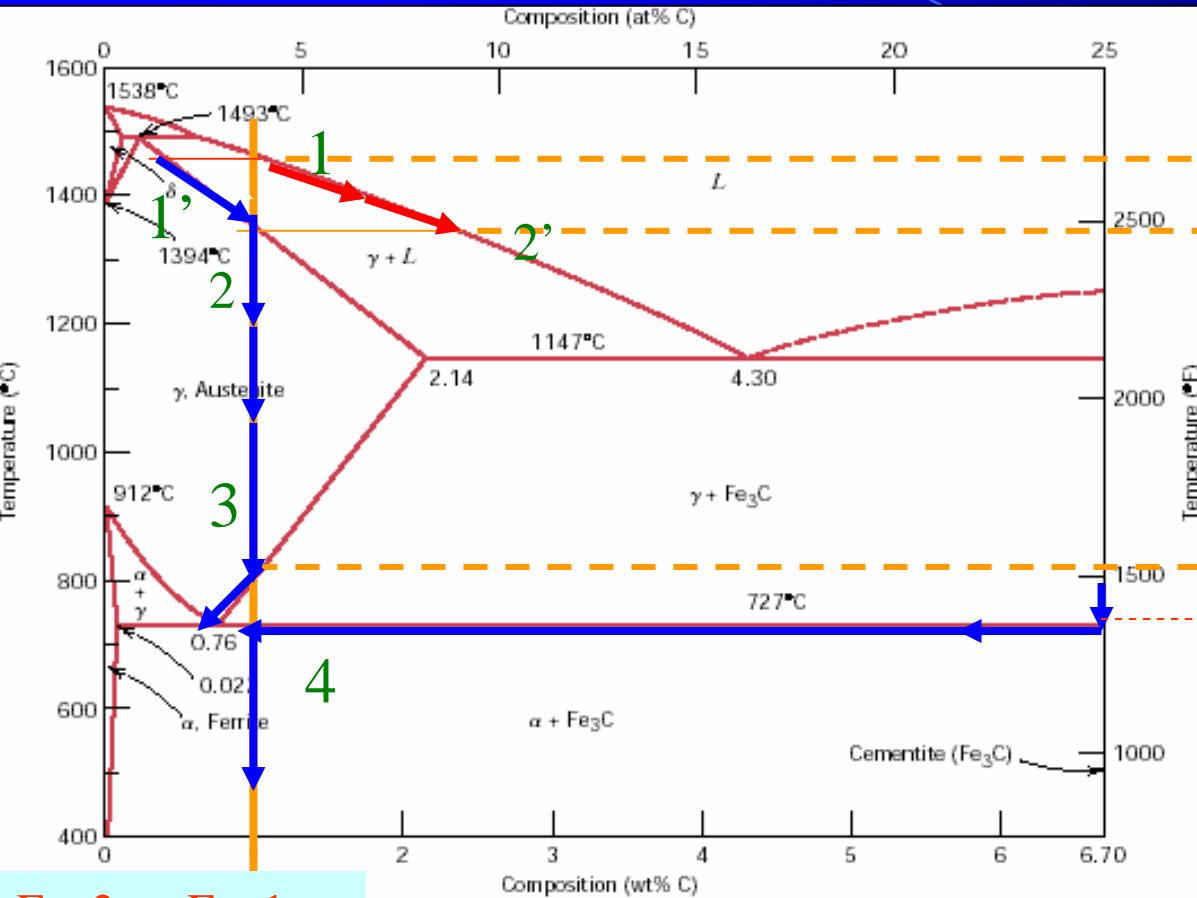
$$W(p) = 1 - 49.5\% = 50.5\%$$

由铁素体析出的渗碳体称为三次渗碳体

C_0 0.4

Composition (wt% C)

析晶分析(1.0%)



$F=2$ $F=1$ on-iron carbide phase diagram. (Adapted from *Binary*
 $L \longrightarrow 1 \xrightarrow{L \rightarrow \gamma} 2_L [L \rightarrow 0]$, Vol. 1, T. B. Massalski, Editor-in-Chief,
 ASM International, Materials Park, OH.)

$S \longrightarrow 1_s \longrightarrow 2_s \xrightarrow{\gamma} 3 \xrightarrow{\gamma + Fe_3C} 4 \left[\begin{array}{l} F = 0 \\ \gamma = \alpha + Fe_3C \\ \gamma \rightarrow 0 \end{array} \right]$

过共析钢

FIGURE 10.34 Schematic

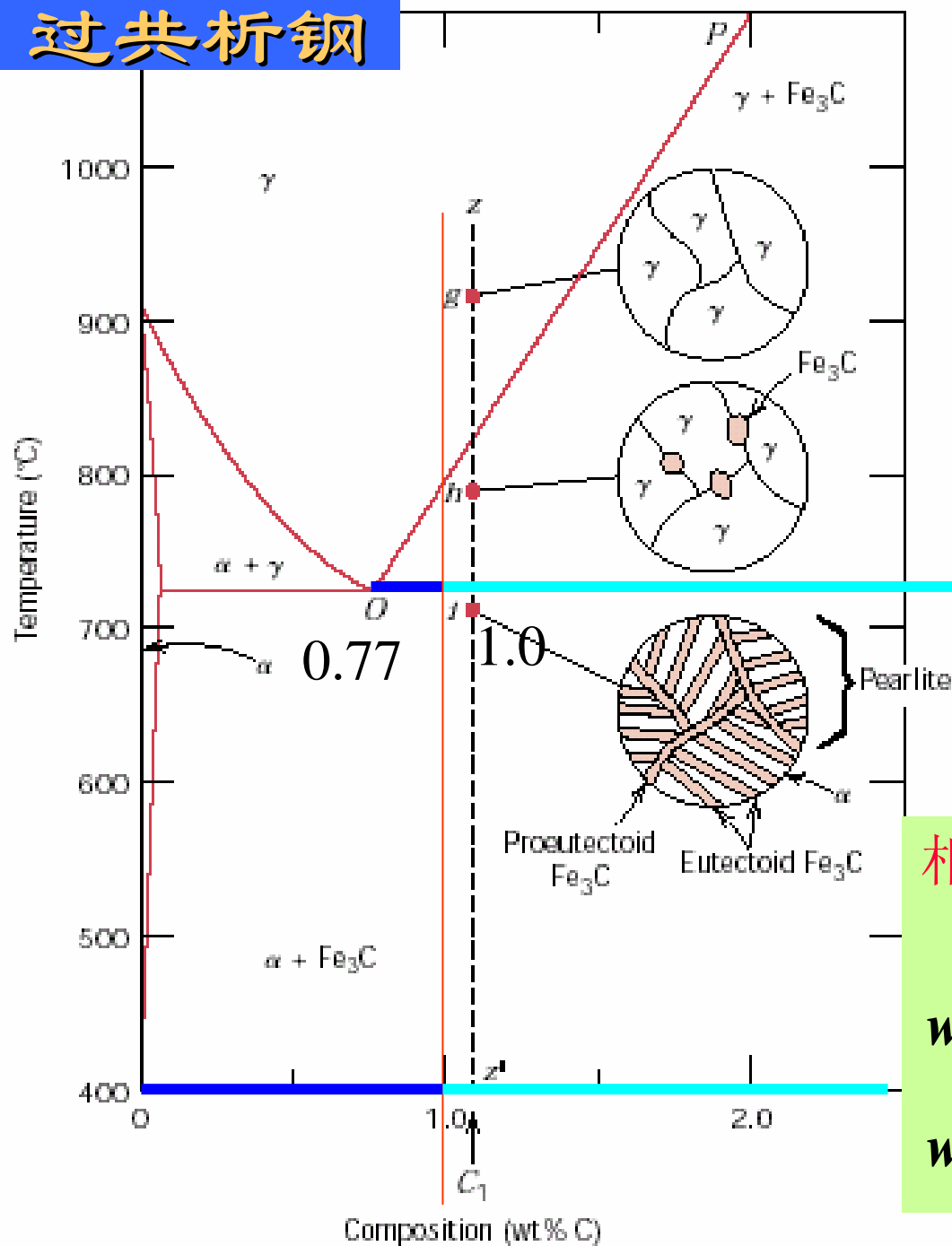
室温组织组成:

二次渗碳体+珠光体

(铁素体+共析渗碳体)

$$w(Fe_3C_{II}) = \frac{1.00 - 0.77}{6.69 - 0.77} = 3.89\%$$

$$w(P) = 1 - 3.89\% = 96.11\%$$



6.69

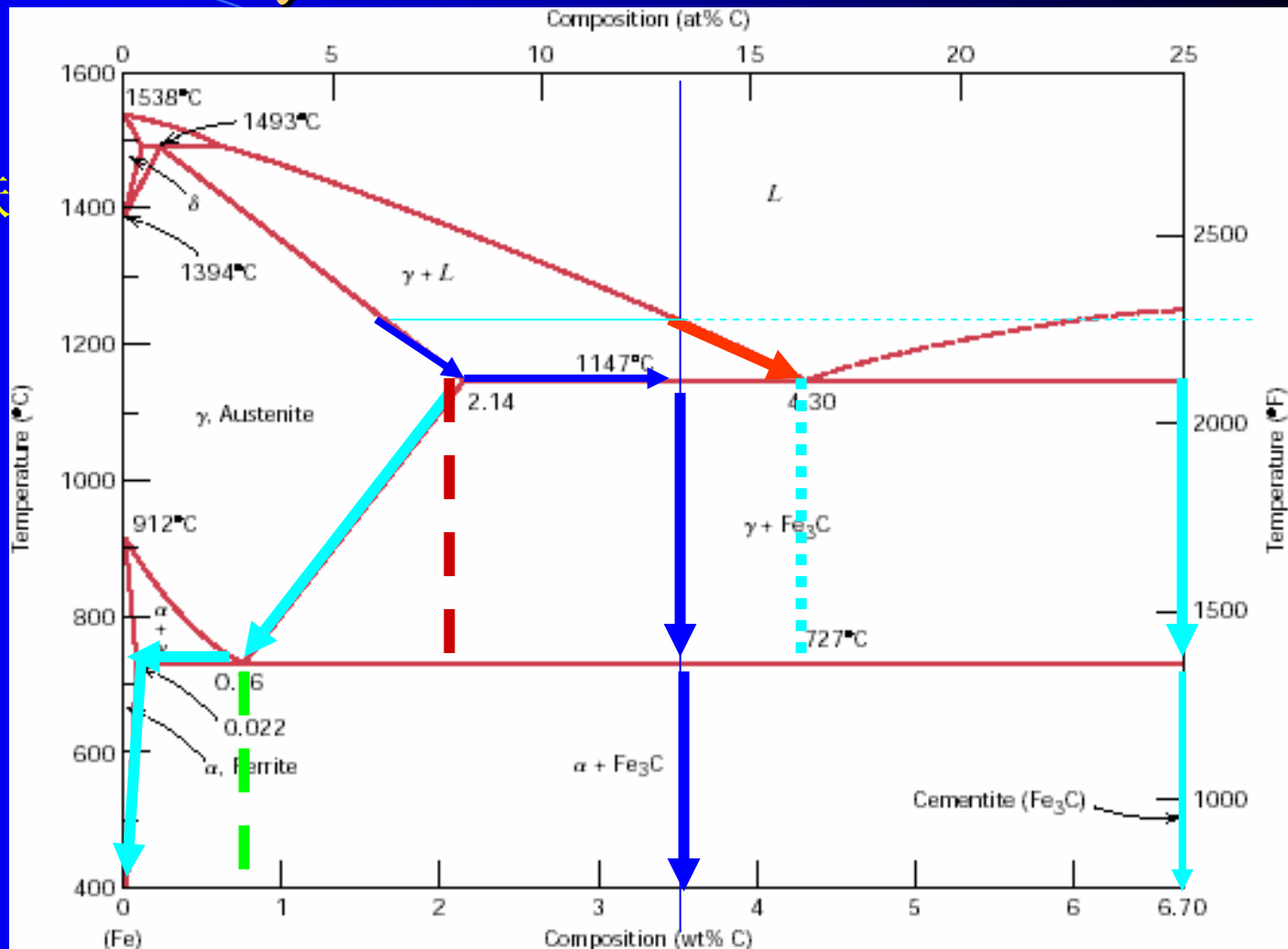
相组成: α -Fe + Fe_3C

$$w(\alpha) = \frac{6.69 - 1.0}{6.69} = 85.05\%$$

$$w(Fe_3C) = 1 - 85.05\% = 14.95\%$$

室温组织 (C 3.5%)

亚共晶白口铸铁



组织组成: 变态莱氏体+二次渗碳体+珠光体

相组成: α -Fe + Fe₃C

室温组织组成(C 3.5%)

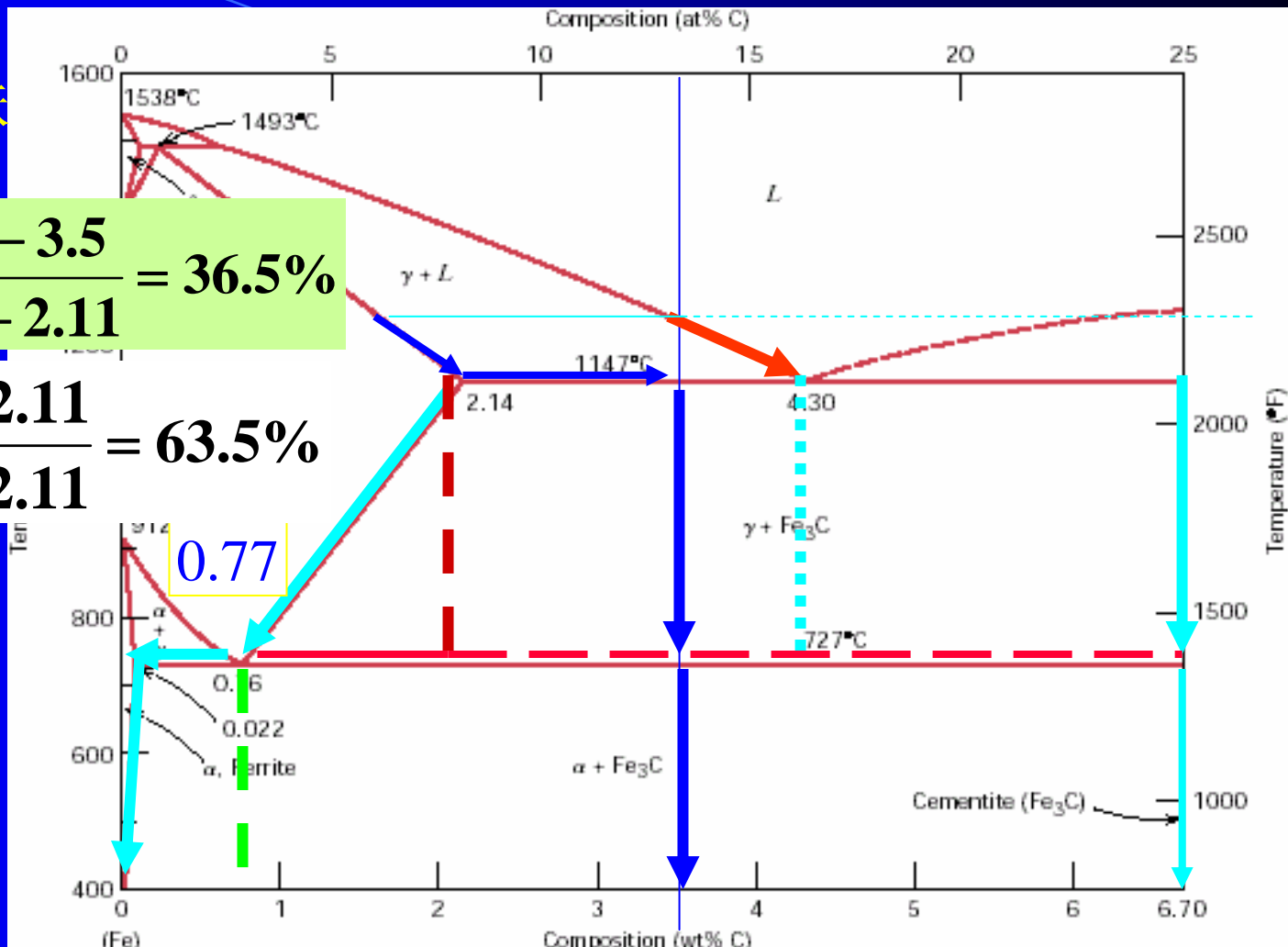
亚共晶白口铸铁

$T=1147^{\circ}\text{C}$

$W(\text{初}\gamma) =$

$$\frac{4.30 - 3.5}{4.30 - 2.11} = 36.5\%$$

$$w(Ld) = \frac{3.50 - 2.11}{4.30 - 2.11} = 63.5\%$$



组织组成: 变态莱氏体+二次渗碳体+珠光体

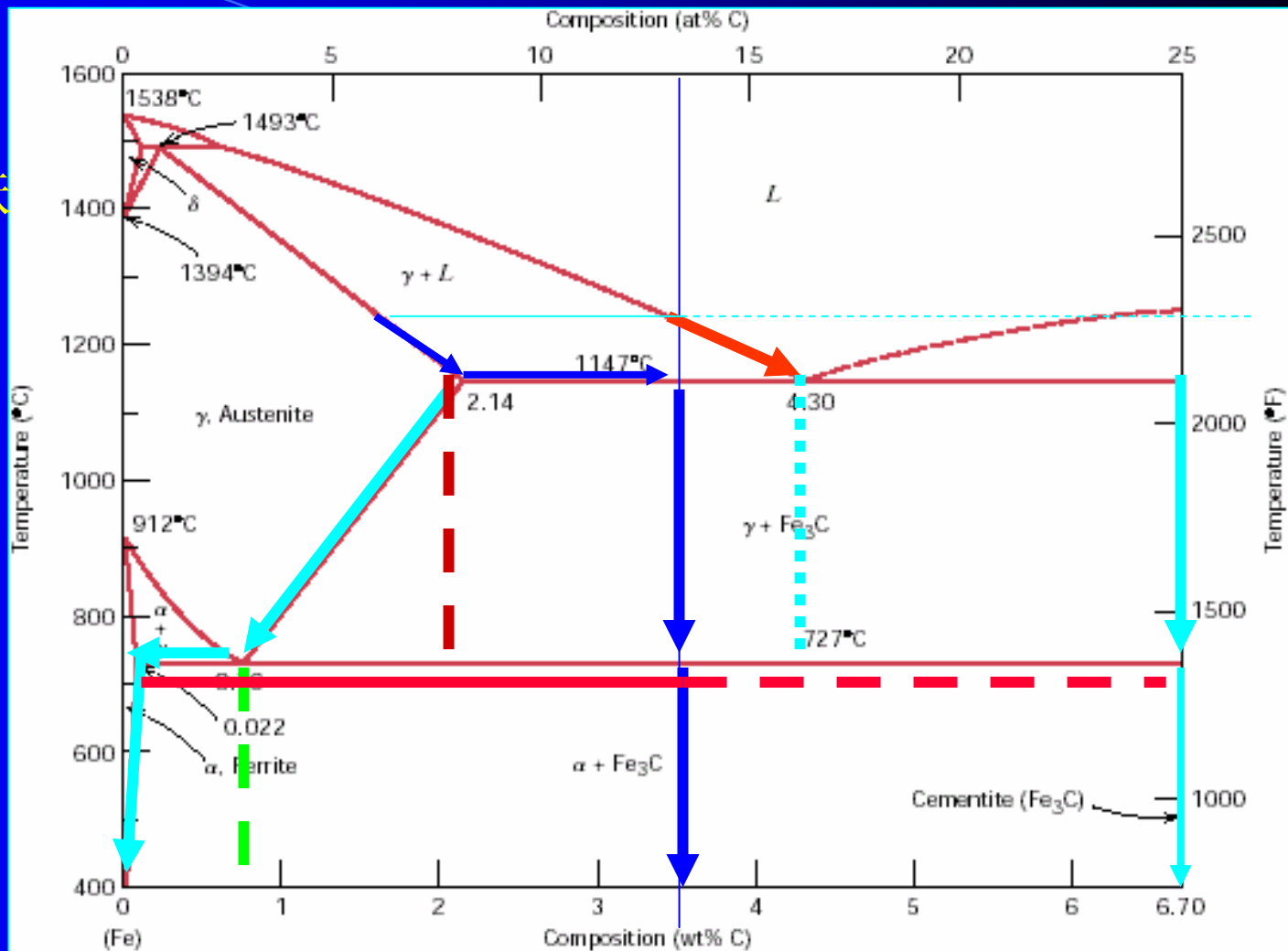
1990. Reprinted by permission of ASM International, Materials Park, OH.)

$$w(\text{FeC}_{\text{II}}) = \frac{2.11 - 0.77}{6.69 - 0.77} \times 36.5\% = 8.26\%$$

$$w(P) = 36.5\% - 8.2\% = 28.3\%$$

室温相组成(C 3.5%)

亞共晶白口鑄鐵



相组成: $Fe_3C + \alpha - Fe$

$$w(Fe_3C) = \frac{3.5 - 0.022}{6.69 - 0.022} = 52.2\%$$

$$w(\alpha) = 1 - 52.2\%$$