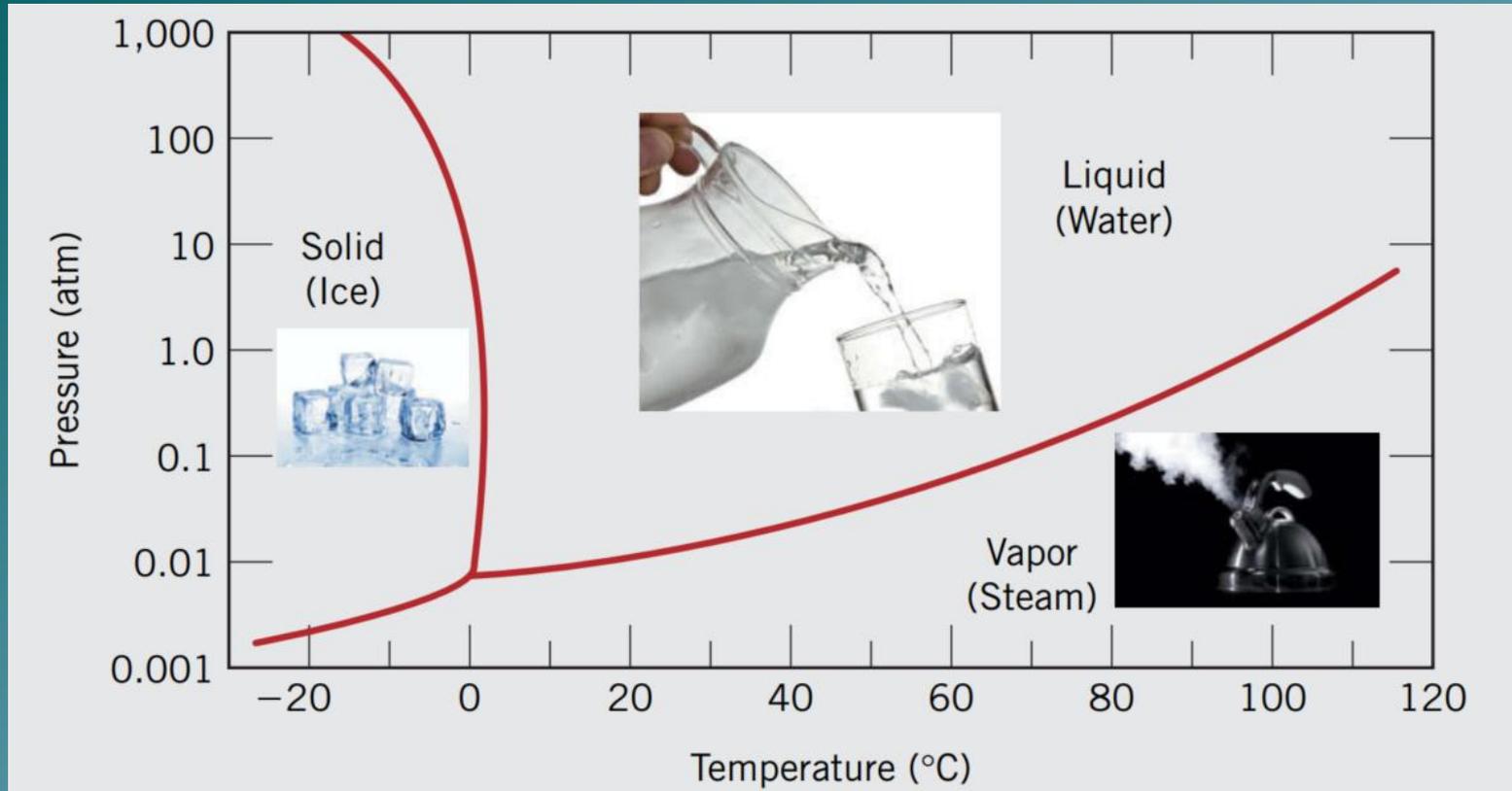


Phase diagrams



a strong correlation between microstructure and mechanical properties

Component:

components are pure metals and/or compounds of which an alloy is composed

Solubility limit:

maximum concentration of solute atoms that may dissolve in the solvent to form a solid solution

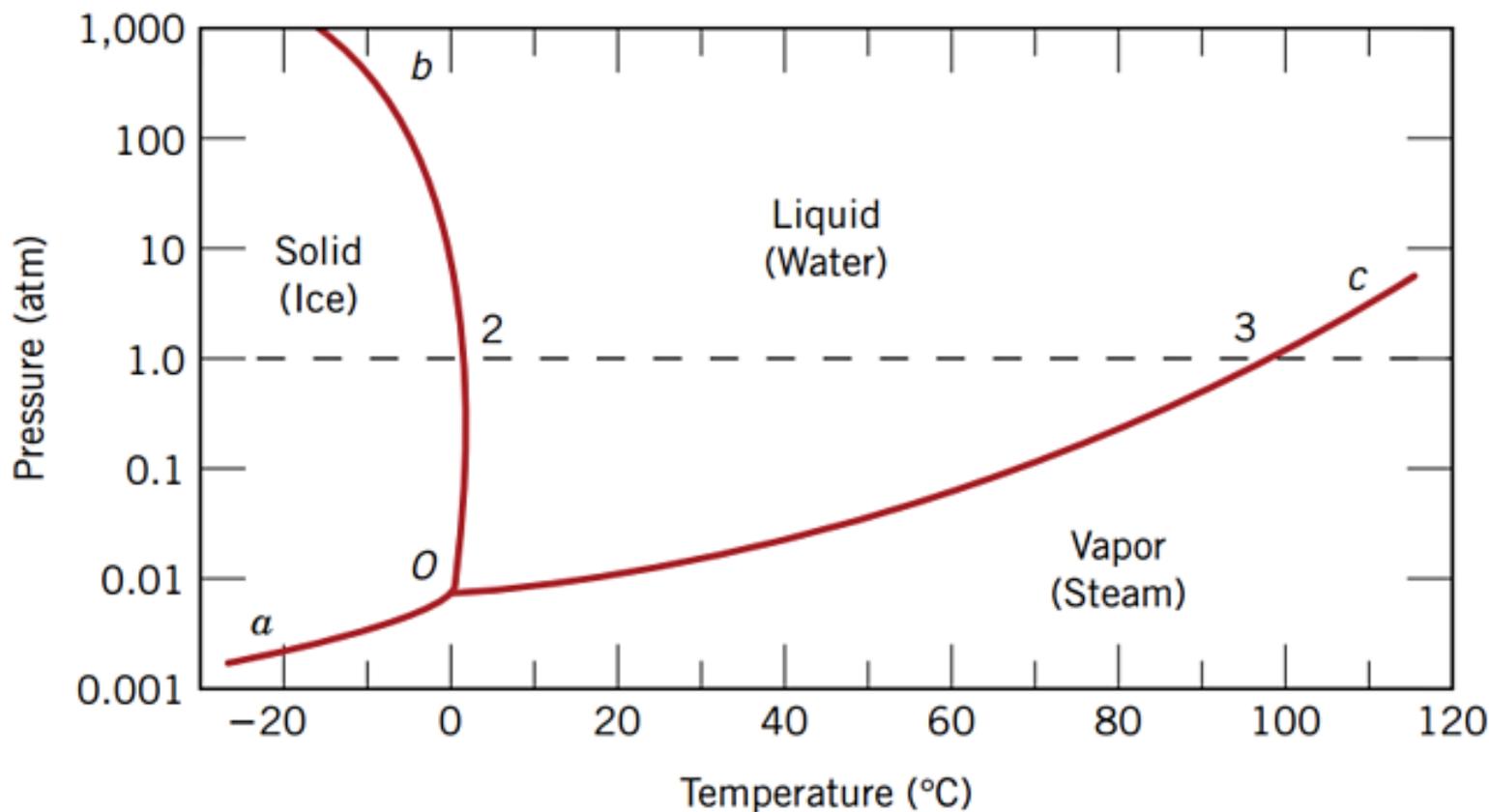
Phase:

a homogeneous portion of a system that has uniform physical and chemical characteristics

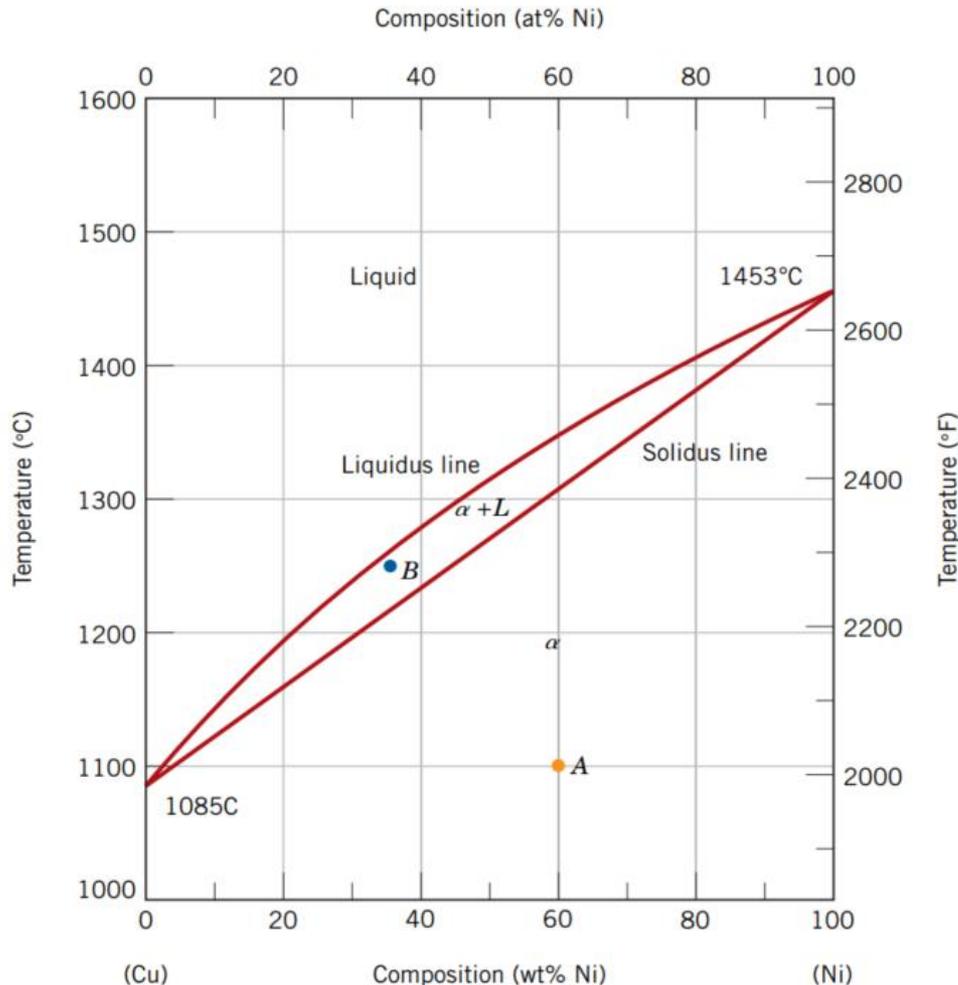
For example, the sugar–water syrup solution just discussed is one phase, and solid sugar is another

phase diagram = equilibrium diagram

One-component phase diagram = unary diagram or pressure-temperature (P-T) diagram



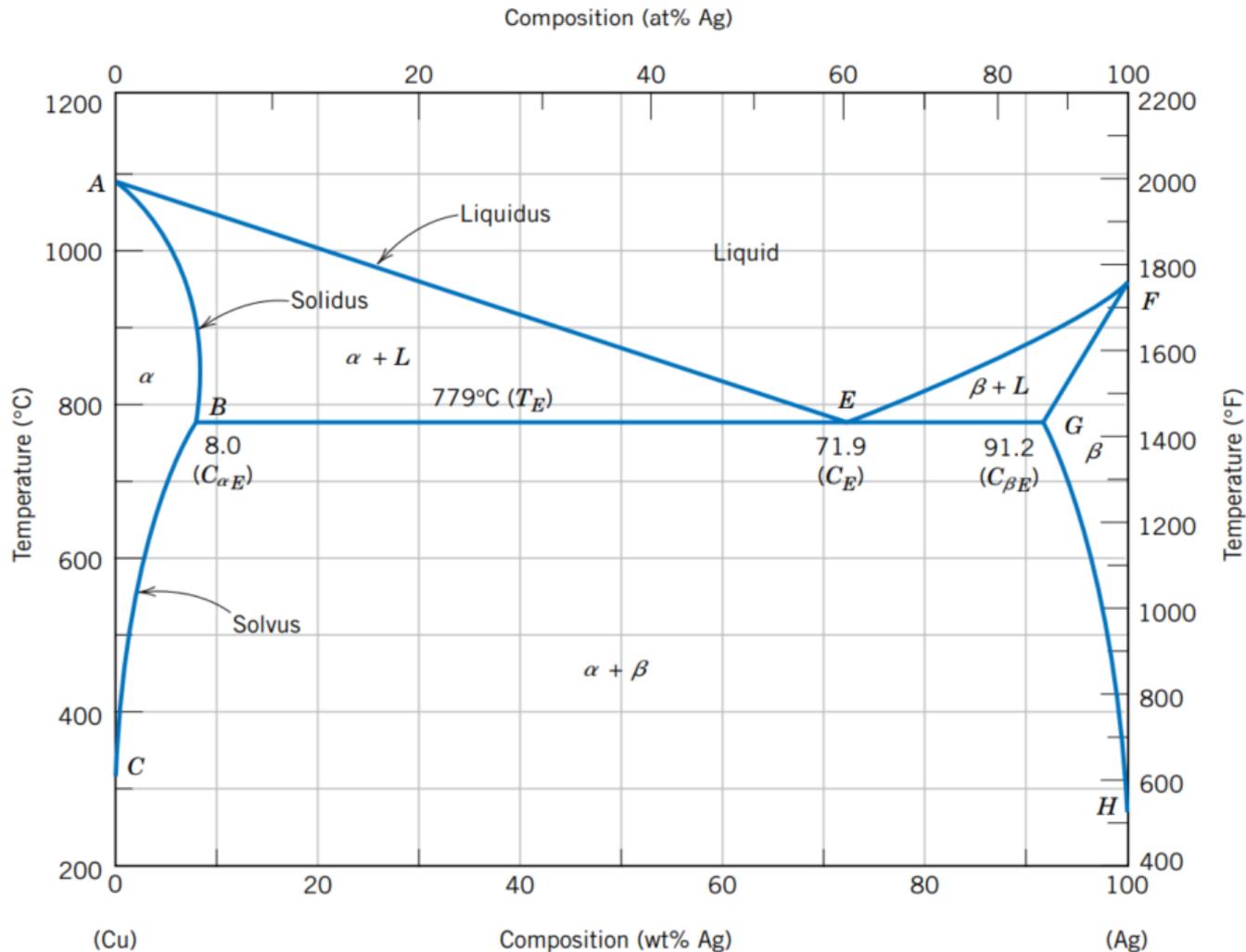
Binary phase diagrams are maps that represent the relationships between temperature and the compositions and quantities of phases at equilibrium, which influence the microstructure of an alloy.



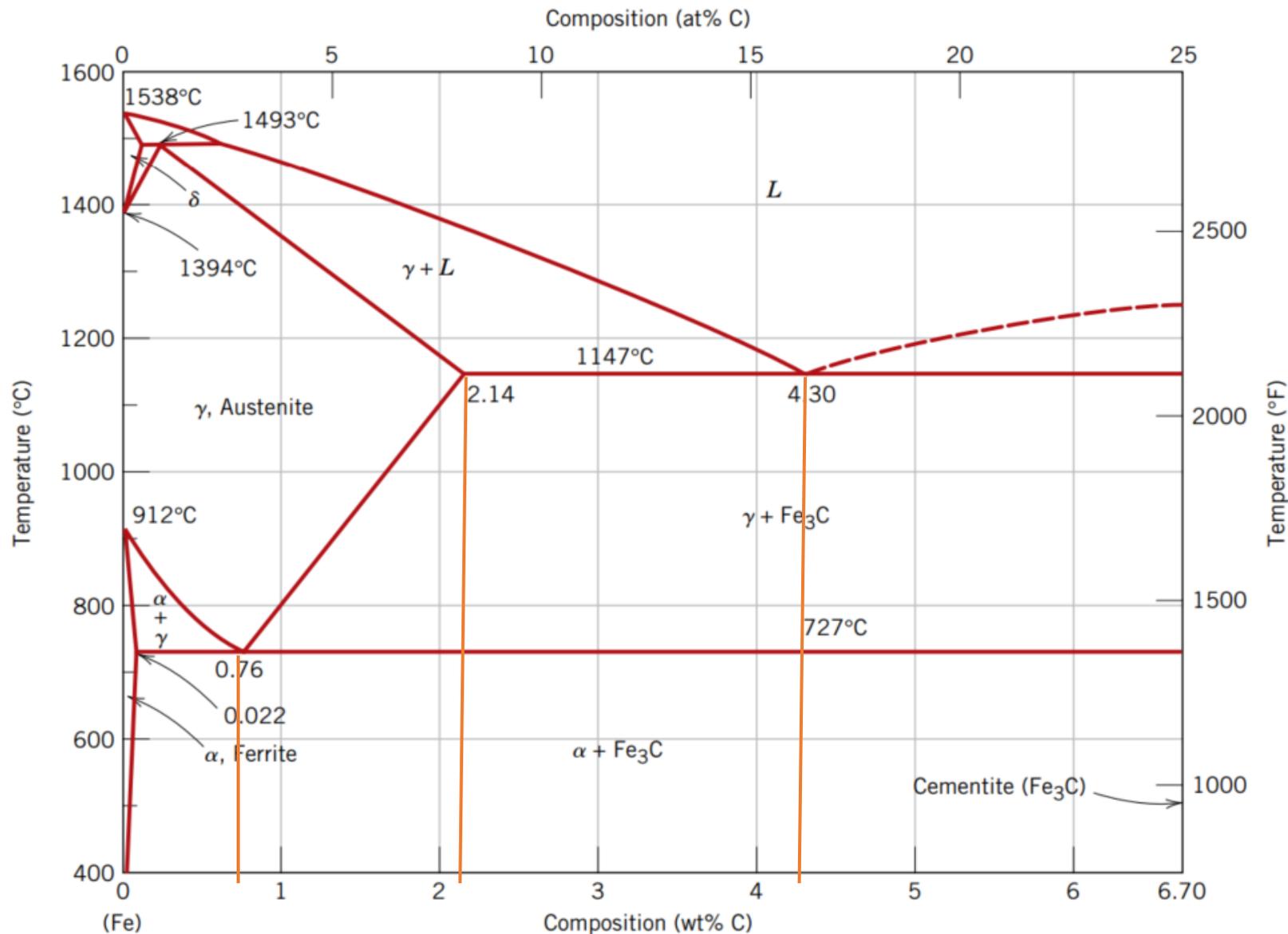
3 different phases region/field:

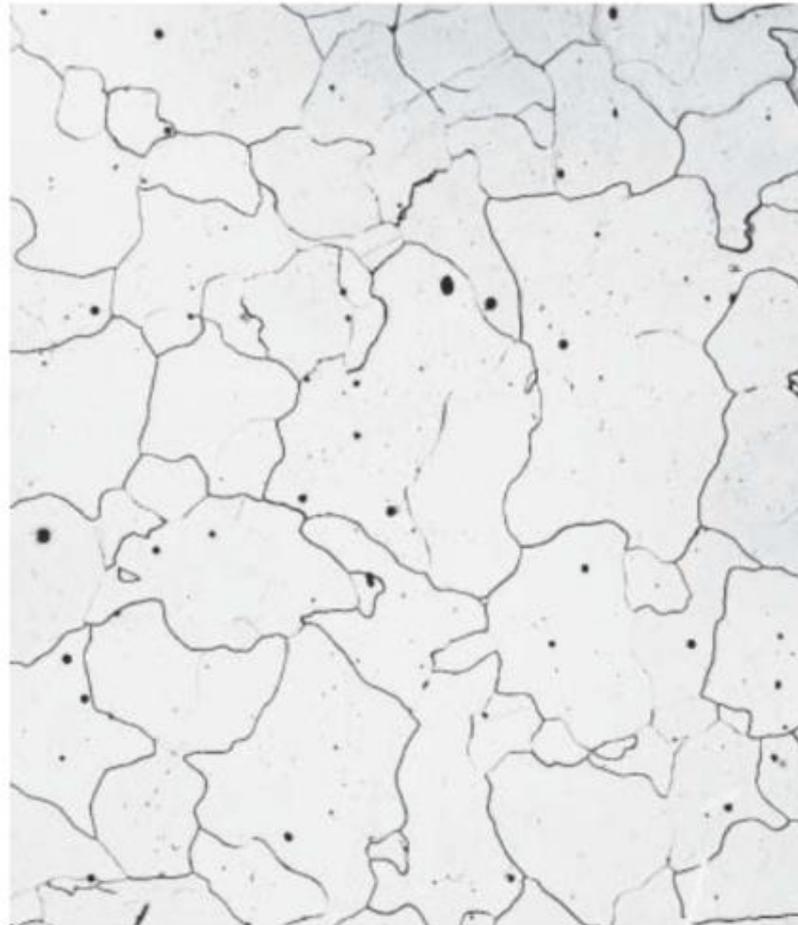
- α - field \rightarrow solid solution
- L \rightarrow liquid
- $\alpha + L$ \rightarrow two-phases field

The copper–nickel system is termed **isomorphous** because of this complete liquid and solid solubility of the two components.



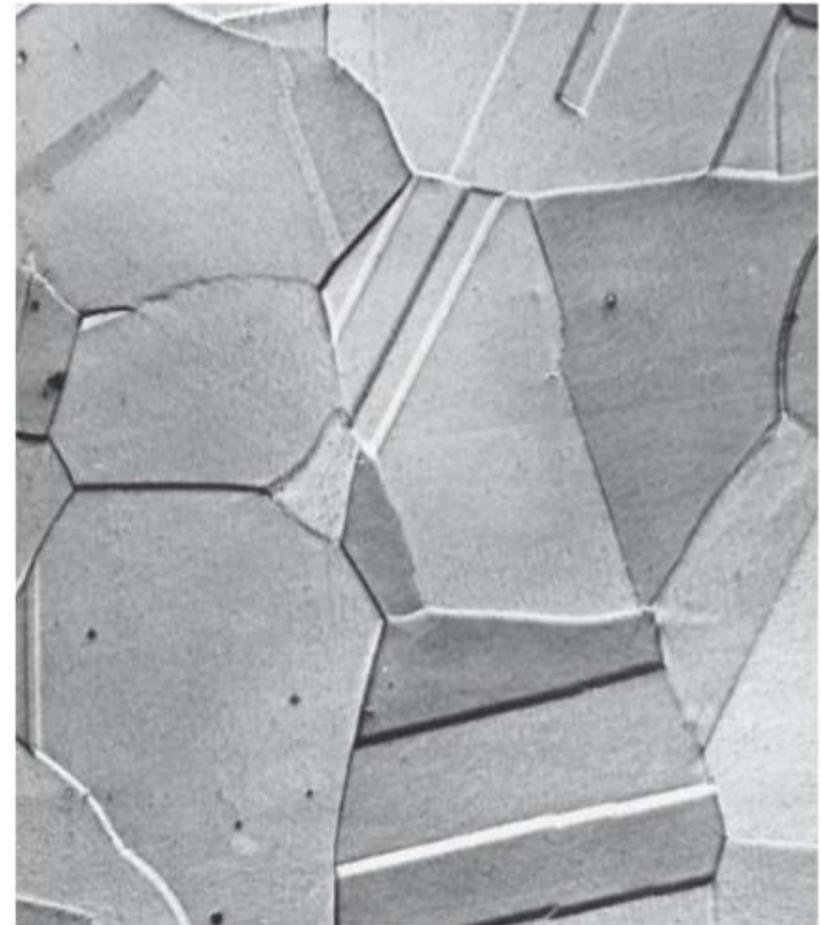
- L \rightarrow liquid
- α - field \rightarrow solid solution, rich in copper
- $\alpha+L \rightarrow$ two-phases field
- β - field \rightarrow solid solution, rich in silver
- $\beta+L \rightarrow$ two-phases field
- $\alpha+ \beta \rightarrow$ two-phases field





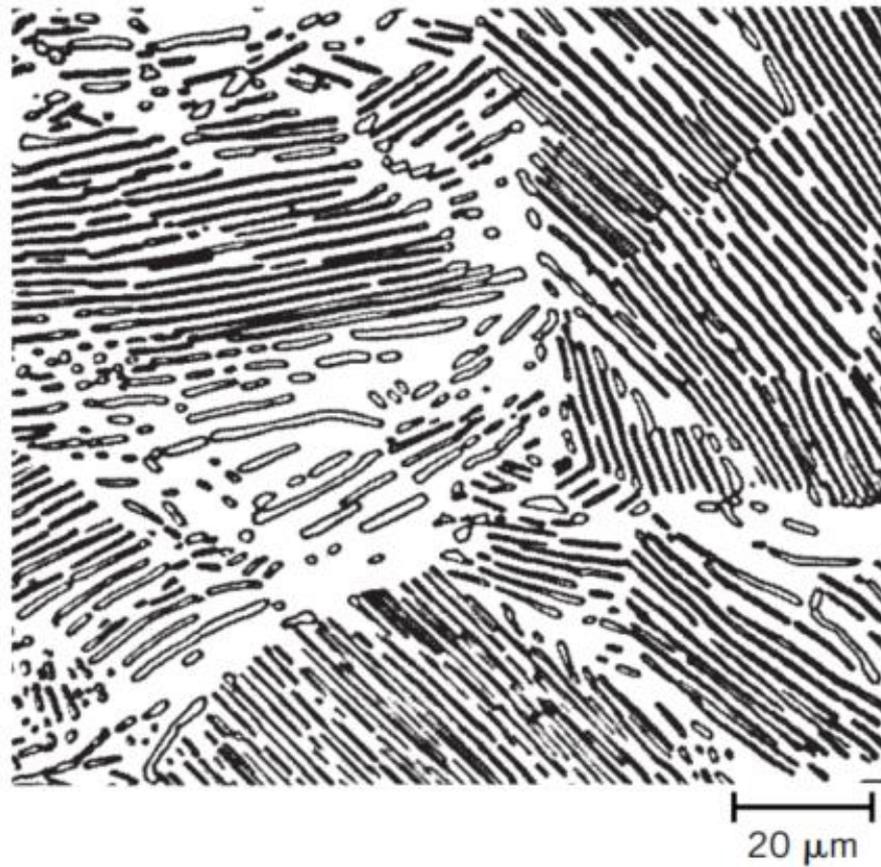
(a)  200 μm

Ferrite - BCC

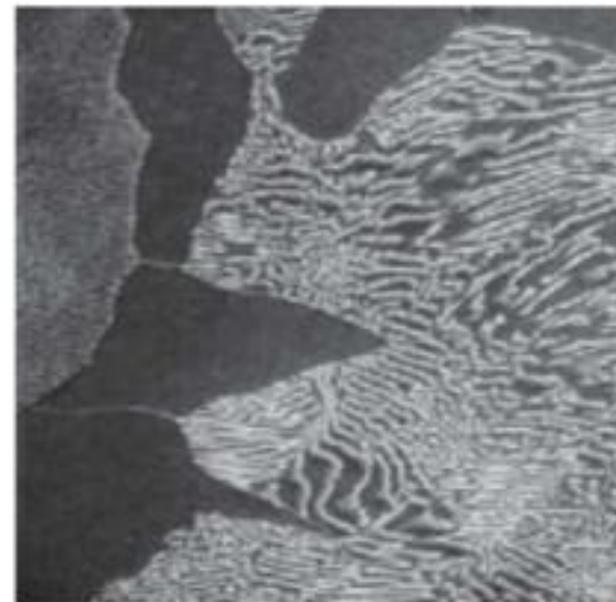
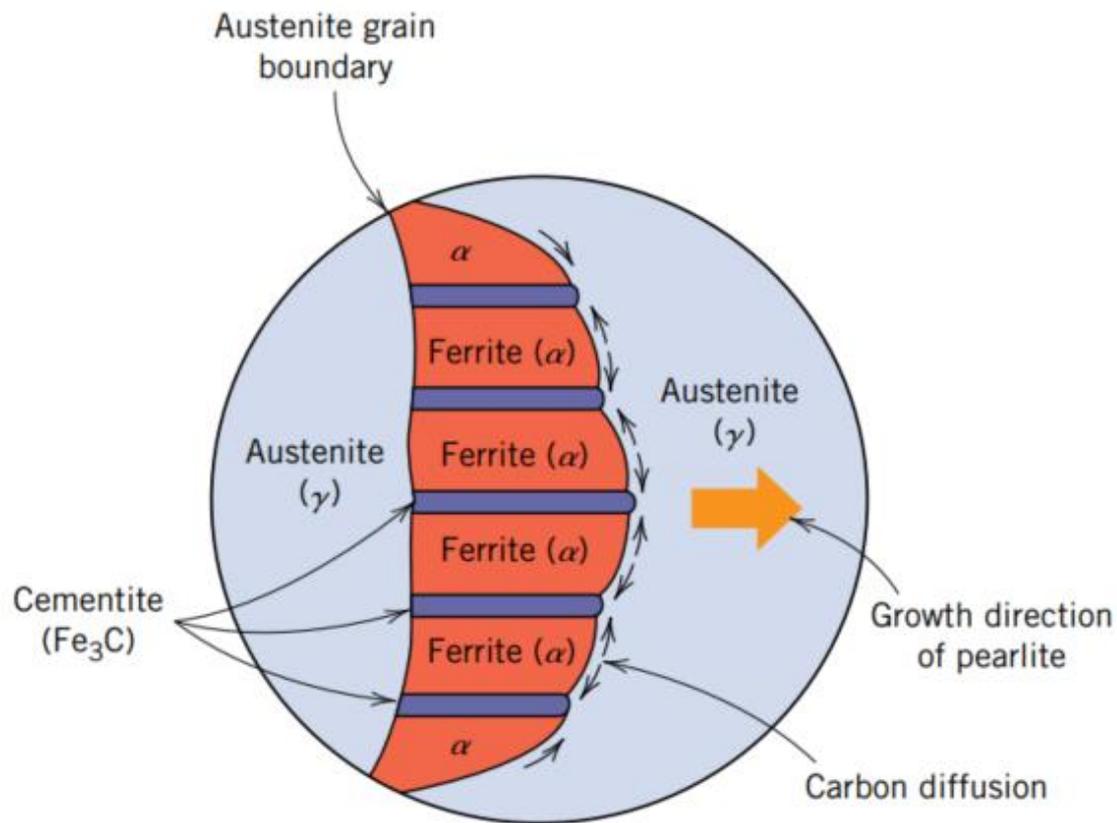


(b)  50 μm

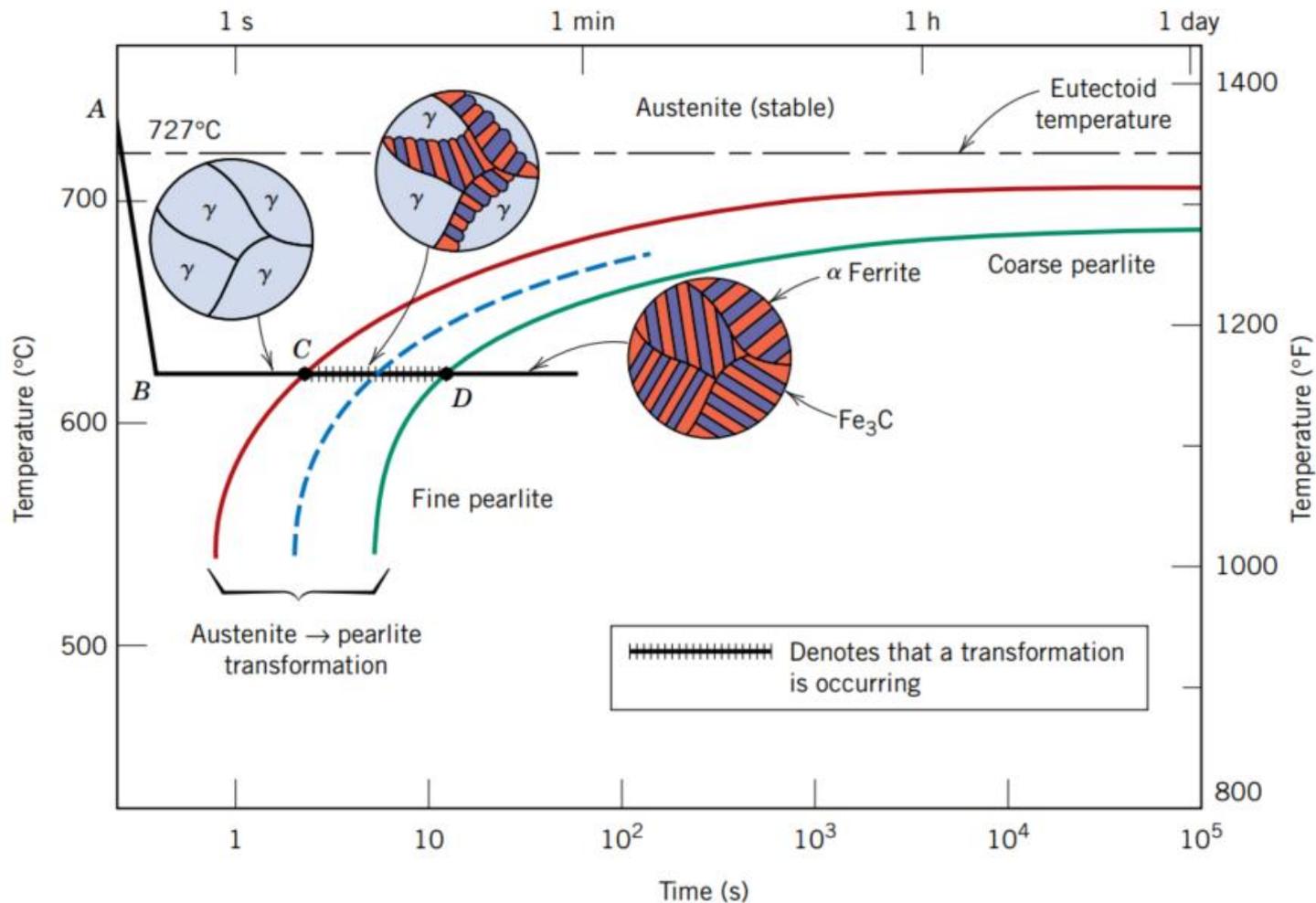
Austenite - FCC



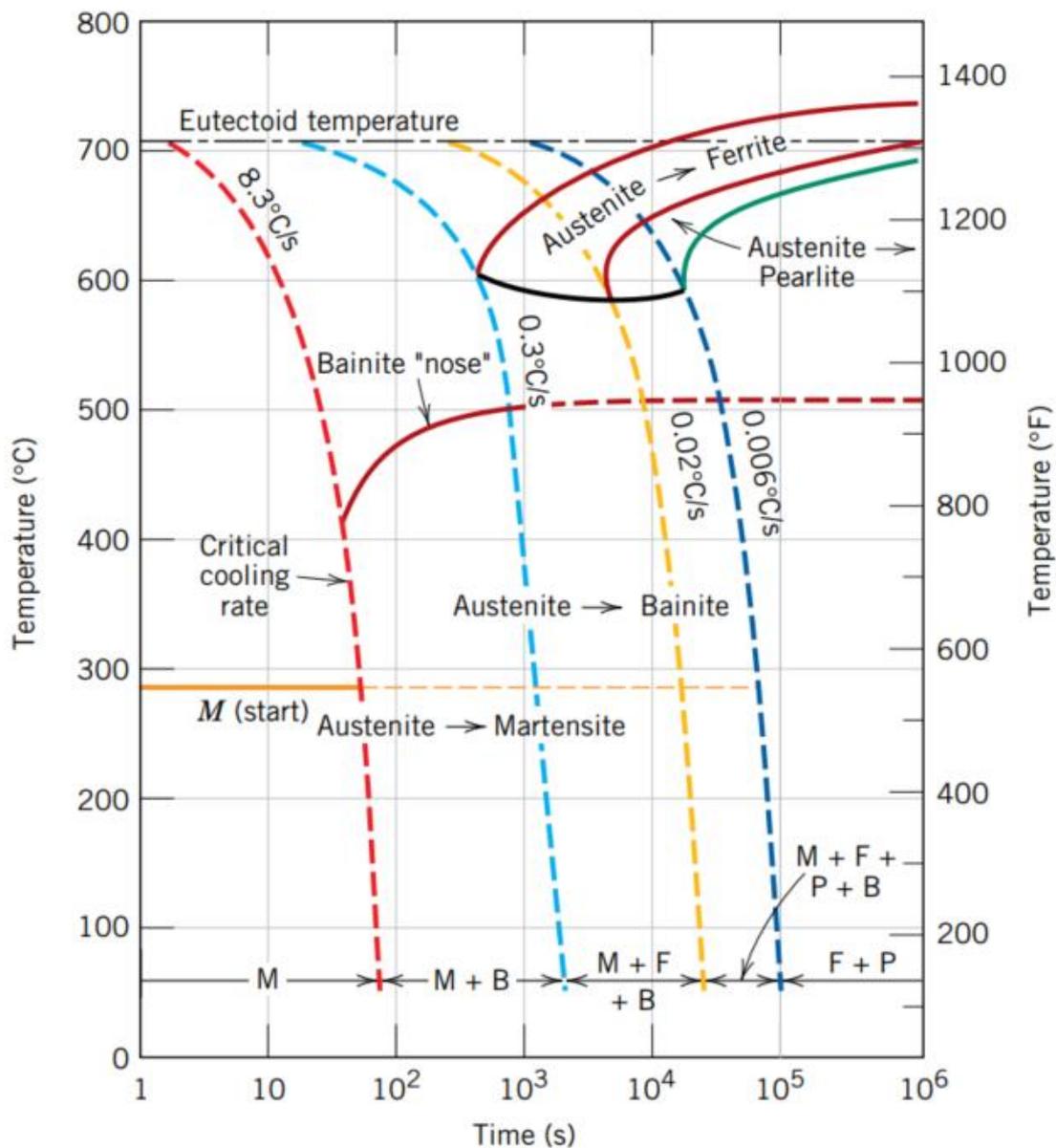
Cementite
Fe₃C



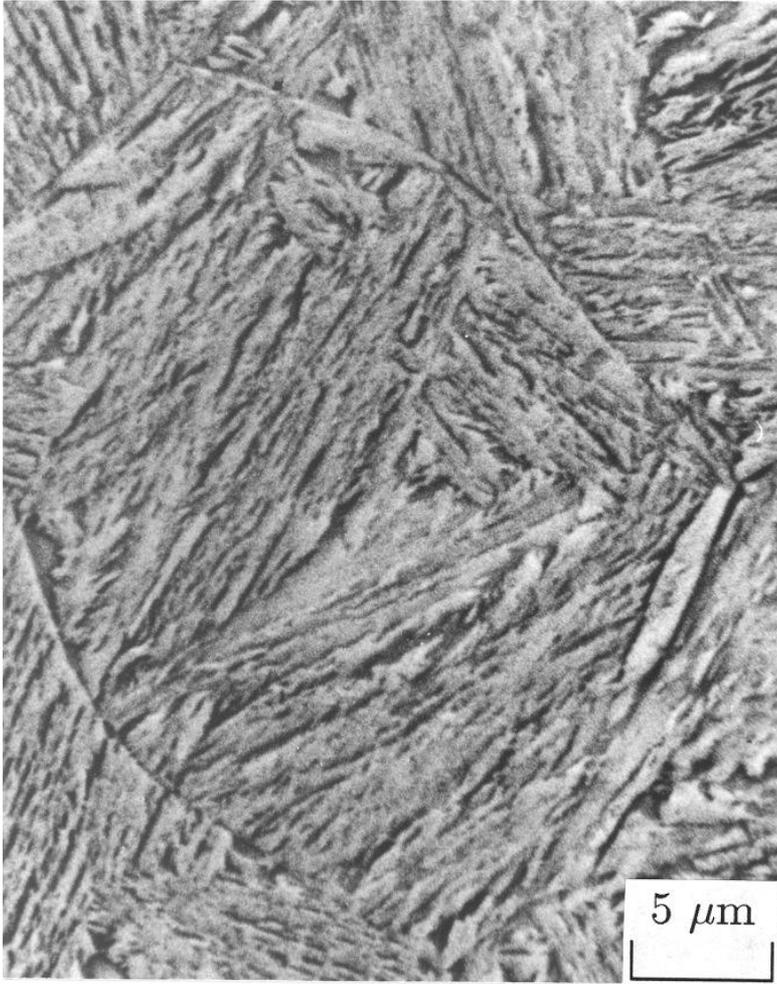
Pearlite



Isothermal transformation



Continuous-cooling transformation



Bainite



Martensite