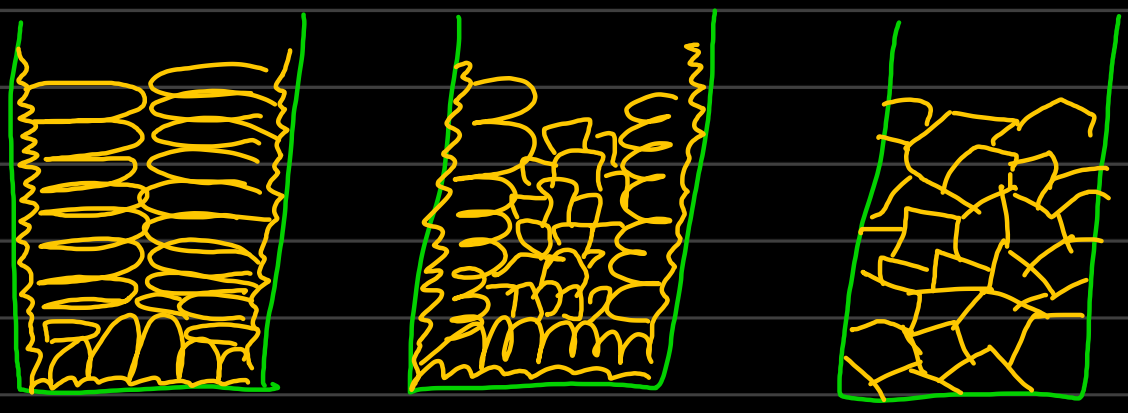
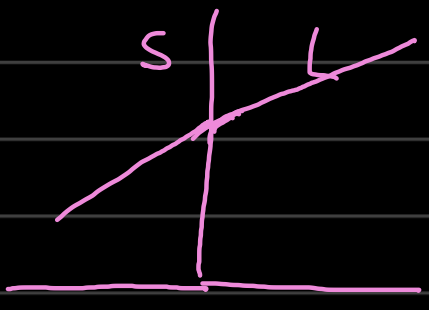
Lecture 3
Materials Processing.

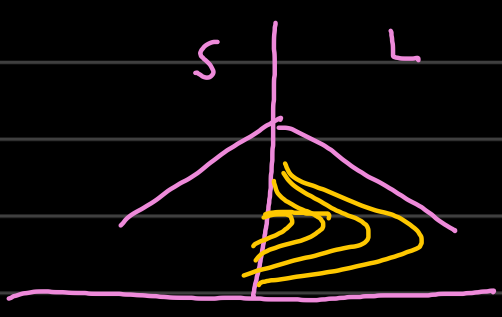
Solidification Microstructure:



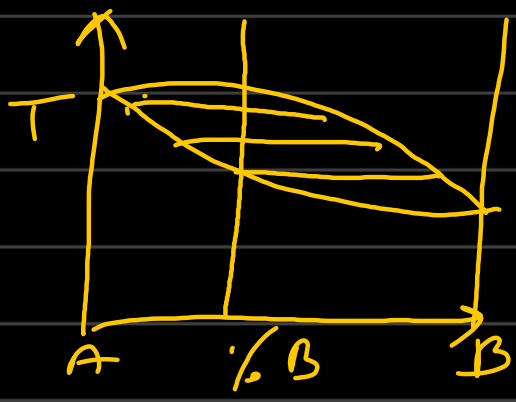
→ dendrites in microstructure:
  ↳ commonly observed when dealing with alloys.
→ temperature profile during solidification.



Planar growth of interface



Dendritic growth of interface.



compositional gradient.

→ dendritic microstructure are stronger

→ equiaxed microstructure are tougher.

Types of casting:

1) Die Casting 2) Sand Casting 3) Investment Casting

Capability and advantage of casting.

Disadvantage:

↳ Mechanical strength is poor: varied microstructure

↳ Surface finish is required.

Sand Casting:

↳ low thermal conductivity
↳ low ΔT
↳ coarse grains formed
↳ unfavourable.
↳ very cheap
↳ environmentally harmful.

* cope & drag, core, open & blind (closed)
  - core → high strength & permeability
  - open → allow gases to escape
  - blind (closed) → trap impurities

* steel cannot be cast using die-casting must rely on sand casting.

→ stress relieve factors.
↳ Various heat treatment may have to be applied.

Die Casting

↳ bulk production of large volumes can be easily produced.