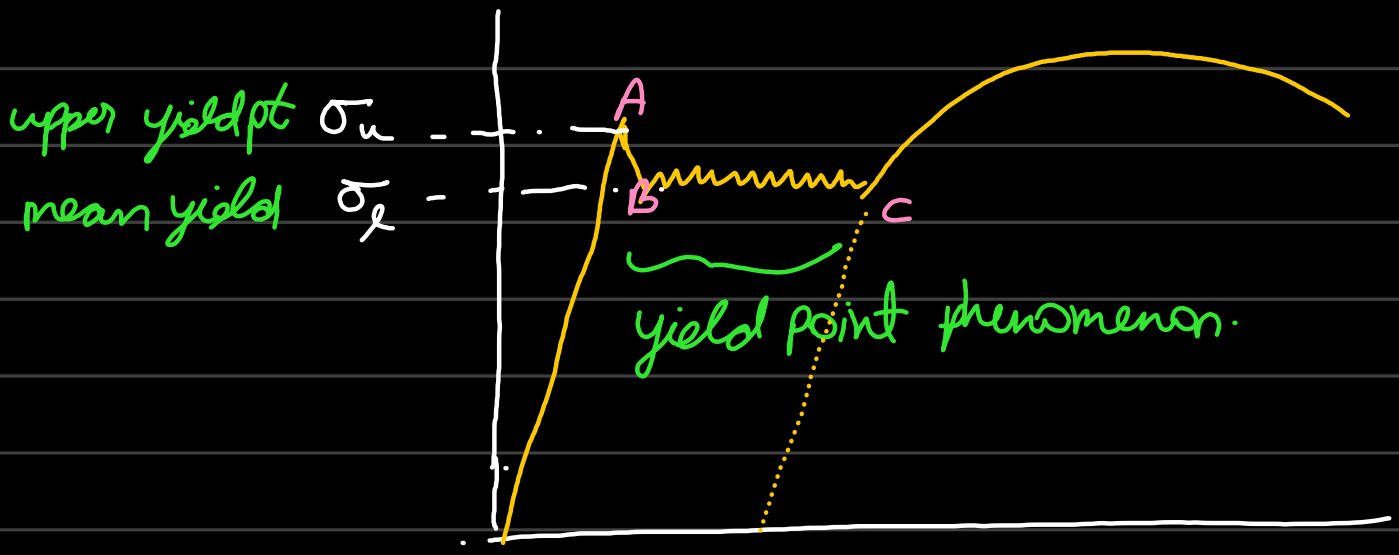
Lecture:

Mild steel stress - strain curve.



* stress conc, a deformation band appears, called Luder bands.
  - ↳ non homogenous deformations.
  - ↳ localized regions have jump in strain.

→ The upper yield pt can be regarded as the nucleation stress (creation of Luder bands)

→ The lower yield pt as the growth of Luder's band

→ Beyond C, deformation is homogenous.

Mechanism behind phenomenon:

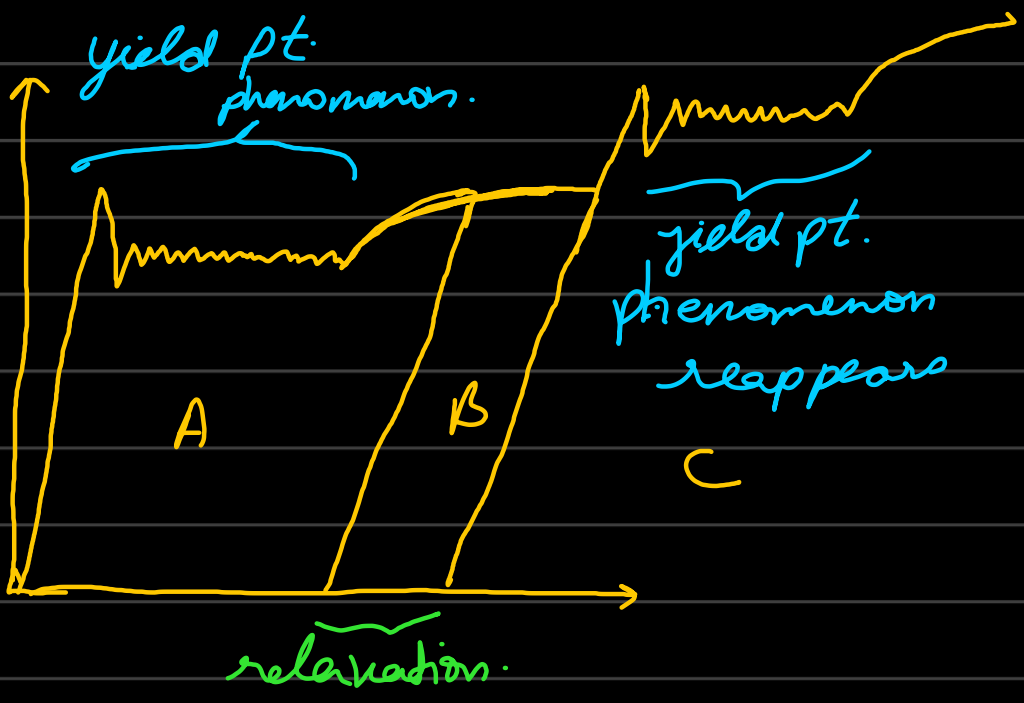
→ yield pt effect is explained by the affinity of interstially dissolved atoms for dislocations.

★ Cotrell atmosphere:

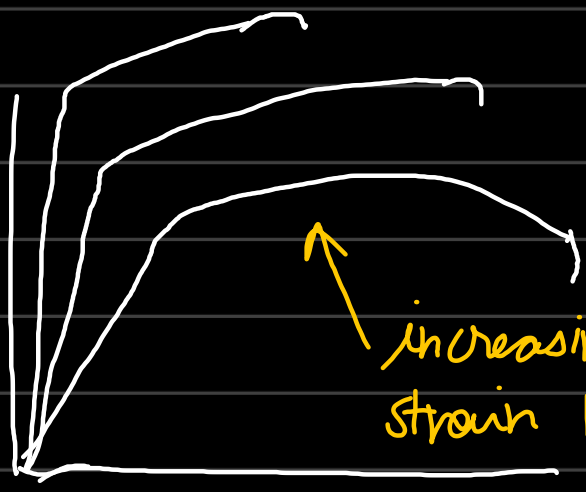
↳ local atmosphere below dislocations where interstitials accumulate and pin dislocation movement.

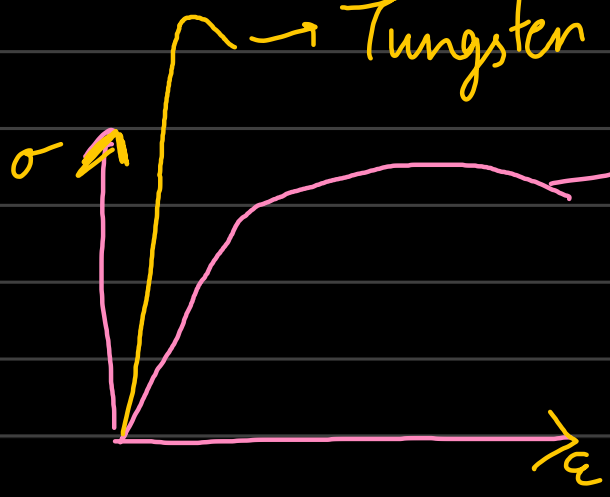
→ Upper and Lower yield point serrations:

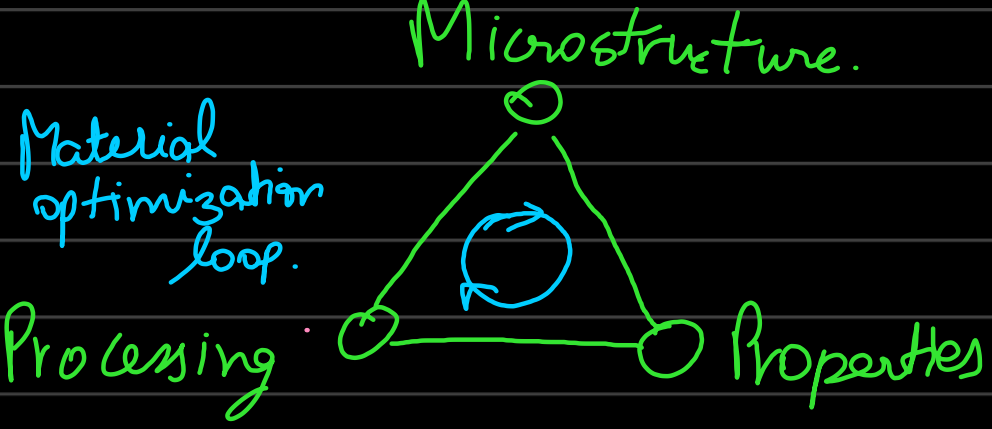
★ Also called Strain-ageing



Effect of strain rate and temperature on stress-strain curve







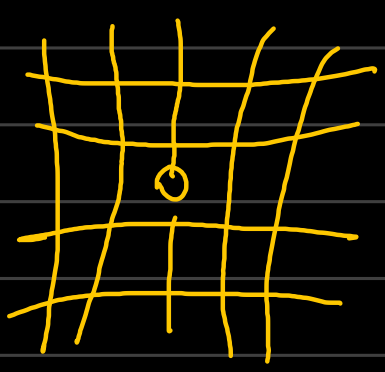
Defects in Solids:

Types of Defects:

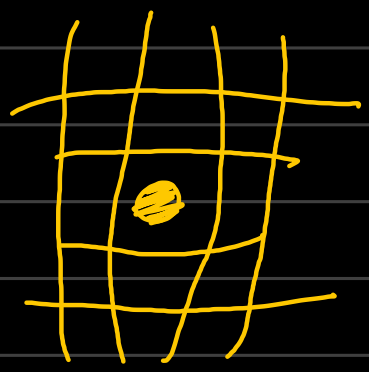
0-D : point defects

1-D : line defects (dislocations)

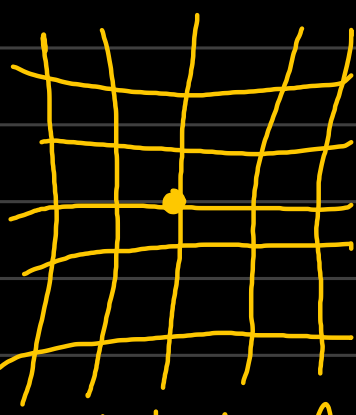
2-D : plane defects (surface, stacking faults)



Vacancy



interstitial



substitutional

1D-defects:

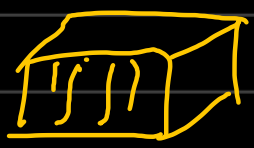
i) Edge Dislocations ii) Screw dislocation:

* Threading dislocation : ⊥ perpendicular to viewing plane.

Observation: only visible in TEM.

★ Etch pit: dislocations intersecting surface.

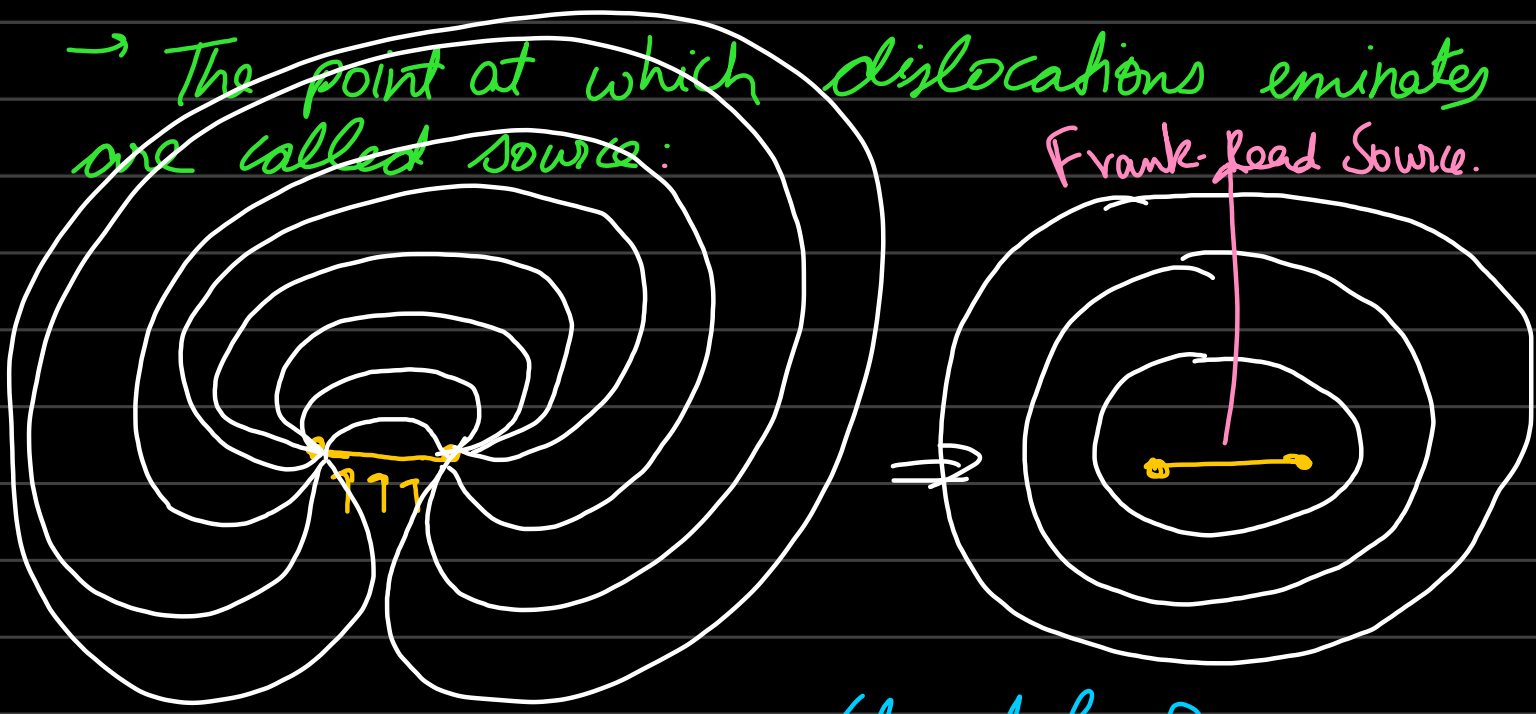
↳ Eg: ⊥lr dislocations in GaN.



★ Source of dislocations:

↳ Frank-Read sources.

→ The point at which dislocations eminates are called source:



→ Closed loop dislocations exist