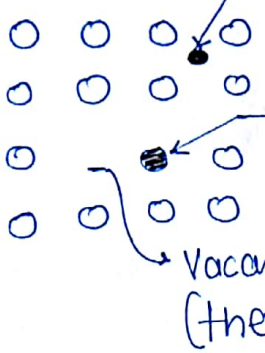
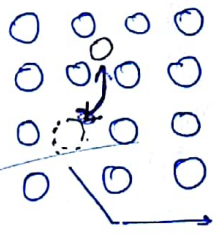
Defect in Material :— (Refer book) Ch-3 Pg 12

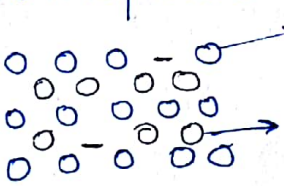
① Point defect :-



Frankle defect :- when atom goes to ~~vacancy~~ interstitial site.



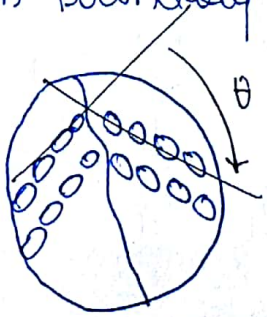
Schottky defect : when cations & Anions disappear in pair.



when either cations or anion is missing from the material it will be charged. so pair of cation and anion will be missing from material but not from same location.

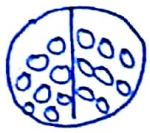
② Surface defects

(i) Grain boundary defects (ii) tilt boundaries ($\frac{1}{2}-1^{\circ}$)

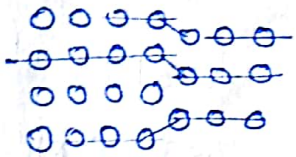


⇒ when mismatch b/w the orientation of atom is around ($\frac{1}{2}-1^{\circ}$) Grain boundary are called tilt boundary

(iii) Twin boundaries :- when the orientation mismatch the grain is such that it is exactly mirror image of each other the grain boundry is called twin boundary.



(iv) stacking fault :-



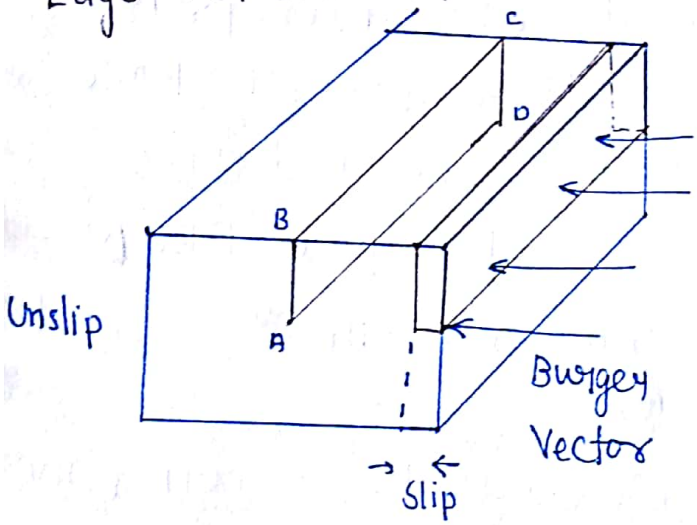
mismatch of Grain orientation.

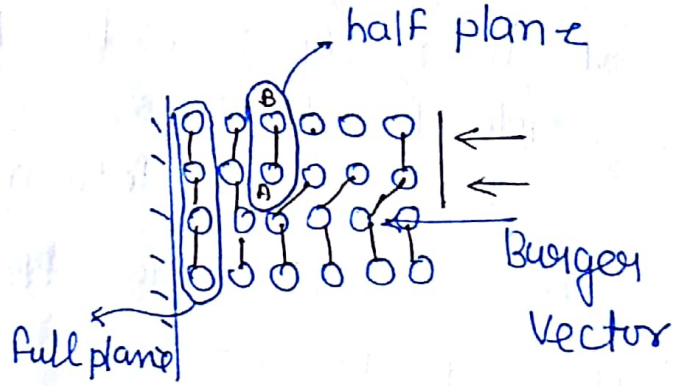
③ Line defect :- (a) edge dislocation
(b) screw dislocation

Edge dislocation define

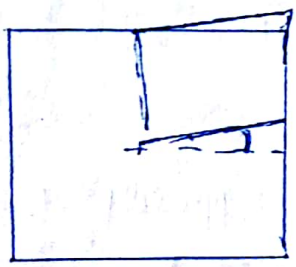
06/08/2016

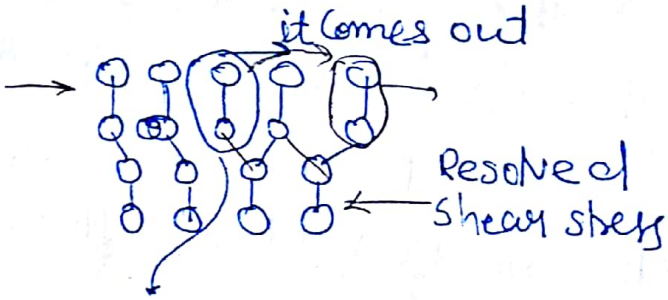
Edge dislocation :- (This defect can't remove)



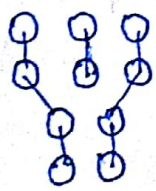


Slip - Unit plastic deformatim





- when this plane comes out it called Critical Resolved shear stress and plastic deformation start



Although millions of dislocation will be there in the real material practically oriented in all the possible direction (These dislocation will be present within Grain boundary) but to understand the concept let us take hypothetical ideal material free from any defect. One surface of this material is restricted to deform and on the opposite face 50% area a uniform pressure is applied.

Once this pressure exceeds beyond a certain ~~value~~ Value there will be sliping of atom and after that dominos effect will follow. This dominos effect will stop at a certain point inside the thickness because the opposite face is restricted to deform. where ever dominos effect stop there appears a half plane 'ABCD'

Line AD is the boundary between unsliped & sliped region called edge dislocation.

At the dislocation side there will be a half plane and due to the presence of this half plane interstitial void at the dislocation side will be slightly larger.

Unit plastic deformation will appear in the direction of applied load and unit plastic deformation is called slip.

Direction of slip is represented by Burger Vector. For edge dislocation Burger Vector will be ⊥ to dislocation line. and For screw dislocation Burger Vector will be ∥ed to dislocation line.

In real material millions of dislocations will be present within the grain so when any type of load is applied on material a component of this load will appear as shear stress in the direction of dislocation or normal to dislocation line called Resolved Shear stress. When this shear stress exceeds beyond a certain value dislocation jump to the new side. This shear stress called critically resolved shear stress.

The moment when dislocation begain to move within the material. It means plastic deformation start within the material. Motion of edge dislocation called glide and motion of screw dislocation called climb.

In case of edge dislocation if the half plane is above the dislocation line it is called positive edge dislocation and when half plane below the dislocation line it is called negative edge dislocation

* Any activity within the material that creat obstacle moment of dislocation it means larger stress require by dislocation to comesout this increase steength of material.