

Assignment 12

1] Match the following boundaries in set 1 to the appropriate choices in set 2.

Set 01

- A) Domain boundary
- B) Anti-phase boundary
- C) Twist boundary
- D) Tilt boundary

Set 02

- P) Small rotation of one grain wrt other with rotation axis in the boundary
- Q) Loss of translational symmetry across the interface
- R) Small rotation of one grain wrt other with rotation axis perpendicular to the boundary
- S) Appearance of rotational symmetry lost during ordering

a) A – S, B – Q, C – T, D – P

b) A – S, B – Q, C – R, D – P

c) A – Q, B – S, C – T, D – R

d) A – Q, B – S, C – R, D – T

2] A stainless steel sample was annealed and the twin boundaries were observed. Some segment of few twin boundaries were found to incoherent and some segments coherent. Pick the correct choice.

a) Orientation of unit cell on either side of coherent boundary is different from orientation of unit cell on either side of incoherent boundary.

b) They do form because both coherent and incoherent segments have the same energy.

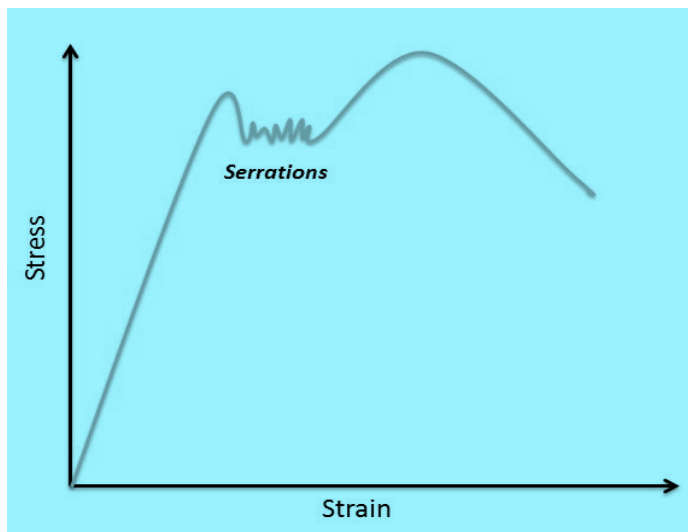
c) The interfacial energy of incoherent interface is smaller than that of coherent interface.

d) Orientation of unit cell on either side of coherent boundary is same as the orientation of unit cell on either side of incoherent boundary.

3] Identify the correct choice regarding misfit dislocations.

- a) They are same as other dislocations in the material
- b) Are always generated in bulk
- c) Reduces the strain associated due to misfit across the interface**
- d) Increases the strain associated due to misfit across the interface

4] Which kind of a dislocation defect interaction results in serration in the flow curve of mild steel?



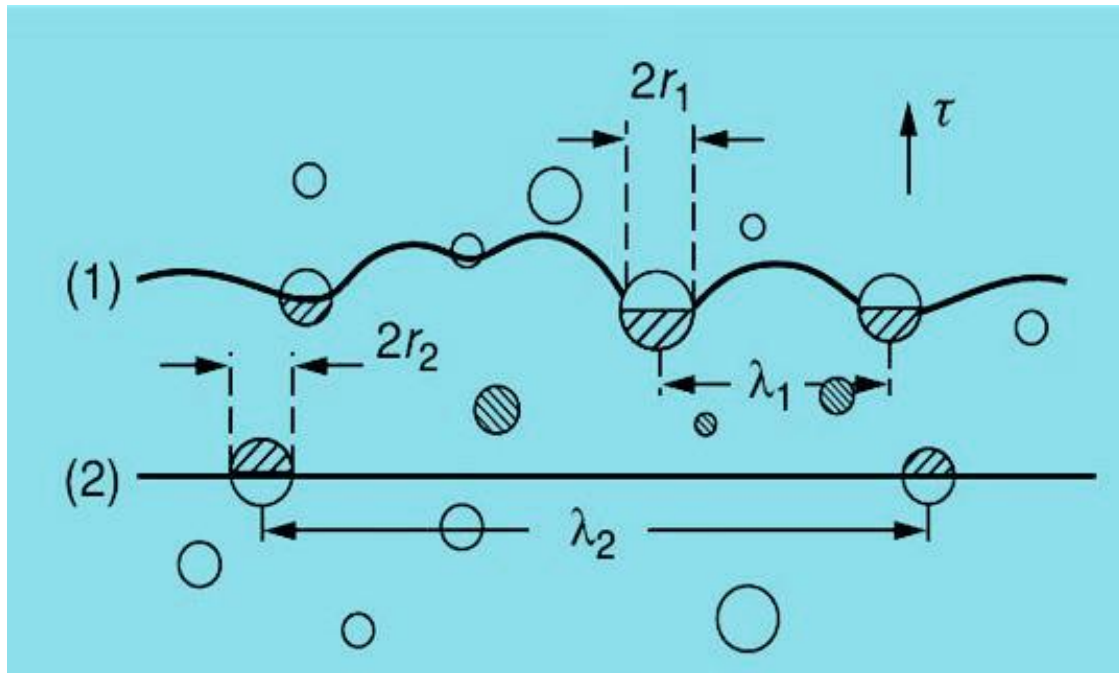
- a) Dislocation - Dislocation interaction
- b) Dislocation – Interstitial interaction**
- c) Dislocation - Vacancy interaction
- d) Dislocation dissociation into partials

7) For spherical coherent precipitate with isotropic elastic properties, the total volume strain energy is proportional to

- a) Square of misfit strain,**
- b) Square of radius of precipitate
- c) Cube of misfit strain

d) Square root of misfit strain

5] The image provided gives the depiction of dislocation precipitate interaction in case of a weak coupling between dislocations. Identify the correct choices.



a) Dislocation 1 is bending to match the line tension to force due to APB

b) Dislocation 2 is straight because APB ordering effect can be neglected.

c) Dislocation 2 is passing through an ordered phase

d) Dislocation 1 is bend because it is trying to loop around precipitates.

6) Identify the correct statements with respect to misfit dislocation

a) Line direction of misfit dislocation lies in the interface plane but Burgers vector is out of the plane.

b) Burgers vector of misfit dislocation lies in the interface plane but there is no restriction on the sense of direction of the dislocation

c) Both the Burgers vector and the line direction has to lie in the interface plane

d) Misfit dislocation exhibit screw in character

8) Precipitates often exhibit faceted interface because

a) Interface energy is different for different planes

b) Strain energy is directional dependent

c) Of anisotropy of elastic properties

d) Growth is dependent on strain

9) Strength of a precipitation hardenable material decreases after specific ageing time because

a) Volume fraction of the precipitate is constant

b) Number density of precipitate decrease with increase of ageing time for constant volume fraction

c) Radius of precipitate increase with ageing time for constant volume fraction

d) Elastic constants of matrix is different from that of precipitate