

Assignment 5

1) A rotation of about 53.1 degrees about $\langle 100 \rangle$ axis of a simple cubic crystal will give _____ CSL boundary.

1 point

- $\Sigma 3$
- $\Sigma 5$
- $\Sigma 7$
- None of these

Accepted Answers:

$\Sigma 5$

2) Guinier Preston zones have _____ interface with matrix.

1 point

- coherent
- semi-coherent
- incoherent
- none of these

Accepted Answers:

coherent

3) A CSL boundary obtained by 21.8 degrees rotation across a (111) plane is

1 point

$\Sigma 3$ $\Sigma 5$ $\Sigma 7$ None of these**Accepted Answers:** $\Sigma 7$

4) If alpha and beta phases have same crystal structure and similar lattice parameter, they can **1 point** form _____ interface.

- low energy coherent
 high energy coherent
 semi-coherent
 incoherent

Accepted Answers:*low energy coherent*

5) Partially coherent precipitate have a _____ shape. **1 point**

- spherical
 cuboidal
 disc
 cylindrical

Accepted Answers:*disc*

6) Which one is a correct statement: **1 point**

- (A) Severe supercooling is necessary for homogeneous nucleation.
 (B) Nucleus forms spontaneously in the melt by random atomic motion by a cluster of a few atoms.
 (C) Foreign matter in melt serves as nucleation catalyst.

- A and B
 B and C
 A, B and C
 A and C

Accepted Answers:*A, B and C*

7) Fine grain size are obtained by :

1 point

- very slow cooling
- decreasing nucleation rate
- fast cooling
- none of these

Accepted Answers:

fast cooling

8) When the contact angle is 60 degrees, the heterogeneous nucleation barrier expressed as a function of homogeneous barrier is

1 point

- 1/2
- 1/4
- 1/8
- none of these

Accepted Answers:

none of these

9) If the product phase does not wet at all the parent phase, the contact angle between the two phases is _____ degrees.

1 point

- 0
- 45
- 90
- 180
- 60

Accepted Answers:

180

10) For a spherical nucleus of radius r , the volume to surface area ratio is

1 point

- $3/r$
- $r/3$
- $3r$
- r

Accepted Answers:

$r/3$

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1 point

$\Sigma 3$

represents

- twin boundary in FCC
- grain boundary
- tilt boundary
- twist boundary

Accepted Answers:

twin boundary in FCC

12) The structure of a low angle tilt grain boundary can be described as

1 point

- screw dislocations
- edge dislocations
- stacking faults
- mixed dislocations

Accepted Answers:

edge dislocations

13) Critical radius and critical Gibbs free energy change _____ with undercooling.

1 point

- decreases
- increases
- no effect
- not related

Accepted Answers:

decreases

14) The homogeneous nucleation rate _____ as a function of undercooling.

1 point

- decreases exponentially
- increases exponentially
- increases linearly
- decreases linearly

Accepted Answers:

increases exponentially

