

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Lecture 44 : Basic Mechanics of Polycrystal Plasticity

Lecture 45 : Basic Mechanics of Polycrystal Plasticity (Contd.)

Lecture 46 : A Metallurgist Point of View

Lecture 47 : A Metallurgist Point of View (Contd.)

Week 10 Lecture Material

Quiz: Week 10 : Assignment 10

Week 10 Feedback Form

Week 11

Week 12

Download Videos

Assignment Solution

Live Interactive session

Week 10 : Assignment 10

The due date for submitting this assignment has passed.

Due on 2021-10-06, 23:59 IST.

As per our records you have not submitted this assignment.

1) How many slip system/s is/are required for plastic deformation according to Sach's law?

1 point

- (a) 1;
 (b) 2;
 (c) 3;
 (d) 5.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a) 1;

2) Texture evolution during plastic deformation is influenced by:

1 point

- (a) Dislocation slipping
 (b) Twinning
 (c) Dynamic recrystallization
 (d) Latent hardening

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a) Dislocation slipping
(b) Twinning
(c) Dynamic recrystallization
(d) Latent hardening

3) How many slip system/s is/are required to deform a polycrystalline aggregate?

1 point

- (a) 1;
 (b) 2;
 (c) 3;
 (d) 5

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d) 5

4) Plastic deformation in single crystal by dislocation glide will not occurs in the slip system:

1 point

- (a) with the lowest Schmid factor.
 (b) with the highest Schmid factor.
 (c) which will experience maximum τ_{RSS}
 (d) which will have minimum τ_{CRSS} .

- a
 b
 c
 d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

5) Taylor model considers:

1 point

- (a) one slip systems in each grain.
 (b) all grains undergo same stress as the overall material.
 (c) for grain boundary contiguity by imposing different strain tensors in each grains.
 (d) minimum Taylor factor by establishing the combination of slip systems that minimizes $\sum_{i=1}^n dy_i$ i.e., the work per unit volume within a grain.

- a
 b
 c
 d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

6) Cells and subgrain boundaries are:

1 point

- (a) incidental dislocation boundaries – IDBs.
 (b) geometrically necessary boundaries – GNBs
 (c) high density statistically stored dislocations.
 (d) have misorientation/disorientation angle $<15^\circ$.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a) incidental dislocation boundaries – IDBs.
(c) high density statistically stored dislocations.

7) Geometrically necessary boundaries evolve during deformation due to:

1 point

- (a) statistical trapping of dislocations during plastic slip.
 (b) dynamic recovery processes.
 (c) the difference in active slip systems and/or different magnitudes of plastic slip among neighbouring regions of individual grains.
 (d) the difference in stress tensor acting near the grain boundary and away from the grain boundary of individual grains.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c) the difference in active slip systems and/or different magnitudes of plastic slip among neighbouring regions of individual grains.
(d) the difference in stress tensor acting near the grain boundary and away from the grain boundary of individual grains.

8) Match the following sentences regarding deformation induced microstructural hierarchy:

1 point

- | | |
|------------------------------------|--|
| A. Shear Bands | 1. develop in coarse-grained or low SFE materials without Goss texture |
| B. Twins | 2. are Geometrically necessary boundaries |
| C. Cell bands or blocks | 3. Develop in low SFE materials |
| D. Deformation or Transition bands | 4. are independent of size, shape and orientation of grains |

- (a) A-4; B-3; C-2; D-1
 (b) A-3; B-2; C-1; D-4
 (c) A-2; B-1; C-4; D-3
 (d) A-1; B-4; C-3; D-2

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a) A-4; B-3; C-2; D-1

9) As the strain energy of the material increases:

1 point

- (a) Average misorientation/disorientation decreases
 (b) Average cell size decreases
 (c) Average misorientation/disorientation increases
 (d) Average cell size increases

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b) Average cell size decreases
(c) Average misorientation/disorientation increases

10) The average misorientation/disorientation angle is:

1 point

- (a) more for the grains having deformation texture
 (b) Less for the grains having deformation texture
 (c) More for the grains with recrystallized texture
 (d) less for the grains with recrystallized texture

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a) more for the grains having deformation texture
(d) less for the grains with recrystallized texture