

Lecture 13

Sunday, April 27, 2008
9:02 PM

- Ref: 1. G. Dieter, Mechanical Metallurgy, 3rd Edition, McGraw-Hill, 1986.
2. Reed-Hill, Abbaschian, Physical Metallurgy Principles, 3rd Edition, PWS Publishing Company, 1994.

Course Notes:

- No course notes

Review:

- Last time we started out discussing the constant volume relationships regularly used in materials science
- We derived a theoretical shear stress for a perfect lattice -- we saw that the numbers were 100 -10,000 times greater than observed
- This proved to be historical justification for dislocation theory
- We talked about the Cottrell Energy Argument for the balancing forces on dislocation width
- We discussed the Peierls-Nabarro Force -- the force required to move a dislocation through a lattice
- We discussed the factors based on that equation that explain why metals are ductile and ceramics are brittle
- We discussed dislocation motion
- We discussed slip systems -- and how all metals deform in shear
- We discussed the number of slip systems in different crystal structures
- We discussed the critical resolved shear stress (a VERY important concept)
- We discussed Schmid's law and the Schmid factors
- And we finished with an example of a single crystal slip problem using the concepts of critical resolved shear stress to define yielding

Rest of Lecture is available in PowerPoint Presentation Paired with Lecture 13