MEMT 201 Section 001

Instructor: Dr. Prabhu Arumugam

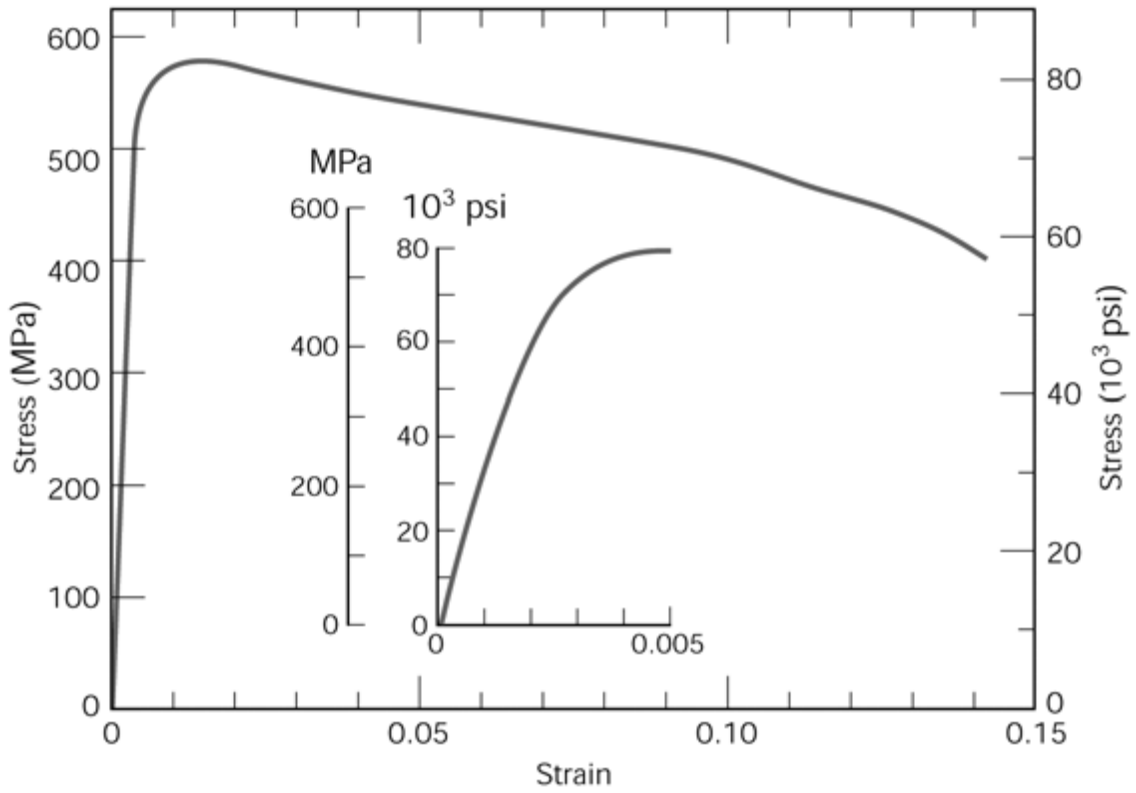
HW #2 (Due: 4/3/19)

1. Calculate the number of vacancies per cubic meter in gold (Au) at 900°C. The energy for vacancy formation is 0.98 eV/atom. Furthermore, the density and atomic weight for Au are 18.63 g/cm^3 and 196.9 g/mol, respectively.

2. A specimen of copper having a rectangular cross section 15.2 mm × 19.1 mm is pulled in tension with 44,500 N, producing only elastic deformation. Calculate the resulting strain.

3. An aluminum bar 125 mm long and having a square cross section 16.5 mm on an edge is pulled in tension with a load of 66,700 N and experiences an elongation of 0.43 mm. Assuming that the deformation is entirely elastic, calculate the modulus of elasticity of the aluminum.

4. The following figure shows the tensile stress-strain curve for a plain-carbon steel.



(a) What is this alloy's tensile strength?
(A) 650 MPa (C) 570 MPa
(B) 300 MPa (D) 3,000 MPa

(b) What is its modulus of elasticity?
(A) 320 GPa (C) 500 GPa
(B) 400 GPa (D) 215 GPa

(c) What is the yield strength?
(A) 550 MPa (C) 600 MPa
(B) 420 MPa (D) 1000 MPa

5. Plastically deforming a metal specimen near room temperature generally leads to which of the following property changes?

   (A) An increased tensile strength and a decreased ductility
   (B) A decreased tensile strength and an increased ductility
   (C) An increased tensile strength and an increased ductility
   (D) A decreased tensile strength and a decreased ductility

6. A steel rod is pulled in tension with a stress that is less than the yield strength. The modulus of elasticity may be calculated as

   (A) Axial stress divided by axial strain
   (B) Axial stress divided by change in length
   (C) Axial stress times axial strain
   (D) Axial load divided by change in length

7. A dislocation formed by adding an extra half-plane of atoms to a crystal is referred to as a (an)

   (A) screw dislocation
   (B) vacancy dislocation
   (C) interstitial dislocation
   (D) edge dislocation