



EMS-162L: Structure and Characterization of Materials Laboratory

Winter Quarter, 2004

Digital Imaging

1. Assume that your digital image capture system can image a 1.20 mm x 0.90 mm region of your specimen at a magnification of 50X. What are the pixel dimensions in your image when captured at the standard 640x480 pixels at a magnification of 200X? Compare this to an upgraded system that can capture a 1600x1200 pixel image.
2. Calculate the memory requirements for a 640x480 24-bit color image and for a 1600x1200 24-bit image. How much smaller would they be after they are converted to gray-scale images?
3. What is the smallest feature that can be resolved in both cases in question 1?
4. Which of the two, the microscope or the digital camera, determines the resolution limits in your images?

Qualitative Metallography

5. What are the characteristic features of the microstructure of a cold worked material? Make a sketch of this microstructure showing the normal, transverse and rolling direction views.
6. Sketch the microstructure of a micro-duplex microstructure that had been severely cold worked and then annealed to fully recrystallize it.
7. What would you look for in a microstructure to better understand the flow patterns in a forged low-carbon steel?
8. What does homogeneity mean in terms of the analysis of a microstructure?
9. If your specimen had been severely oxidized, what evidence of this would you be able to see in the microstructure?
10. You suspect that a carbon steel part, which had been annealed in air, has been severely decarburized. What would you look for in the microstructure to confirm or negate your suspicions?