Nanoscale Science and Applications – Spring 2006
(UAB: PH 487/587; UA: PH 495/595)

Assignment # 2

Due: Wednesday, February 1

Options for turning in assignment:

a. Hand-deliver to Camata in class.
b. Type/draw solutions in the MS Word document and email to camata@uab.edu.
c. Fax to (205) 934-8042 (Attn: Camata)

1. (10 pts) Read Sections 1.4, 1.5, and 1.6 in textbook and prepare a 2-page summary that succinctly describes the following nanofabrication technologies:
   a. Electron Beam Lithography
   b. Focused Ion Beam Lithography
   c. Microcontact Printing
   d. Nanoimprinting
   e. Scanning Probe Techniques

2. (10 pts) The wave nature of electromagnetic radiation sets a limit on the resolution of Optical Projection Lithography.
   a. Discuss the physical processes involved and how they lead to the resolution limit of photolithography.
   b. What is the Rayleigh resolution criterion?

3. (10 pts) Describe at least three technological advances in the area of photolithography that have allowed the semiconductor industry to define ever smaller features on integrated circuits over the past three decades. (Use physical principles to support your answers)

4. (10 pts) What is Fraunhofer diffraction? Discuss its relevance in the process of Optical Projection Lithography.