

ChE 891/2

Experimental Methods in Nanotechnology

Exam 1

10 March 2008

This is an open notes exam, you may bring in notes from the class and homework solutions.

1. Describe, in words, how light is “scattered” and why the scattered light will be 180° out of phase with the incident light.
2. Describe how light and dark regions occur when using an SEM.
3. Can a pure liquid scatter light? Make sure you elaborate a little, not simply yes or no.
4. In dynamic light scattering you measure the autocorrelation function of the scattered light which is then fitted to a function resulting in a measure of the diffusion coefficient. Suppose you have this data:

time (s):	0	1	2	3	4	5	6
Intensity (a.u.)	6	5	4	3	2	1	0

Determine the autocorrelation function of this data for a delay time of 2 s.

5. Why are K shell electrons scattered by the primary electron beam more than L, M or others despite them being the closest to the nucleus?
6. What is the value of the form factor at zero and infinite wave vector? Why?
7. Why are there light and dark regions in a TEM micrograph?
8. What is the maximum resolution of an optical microscope? Why?