

**Chemistry 620**  
**Analytical Spectroscopy**  
**Paper Specific Questions – Paper #2 Due 4/24/08**

Sanchez, E.J., L. Novotny, and X.S. Xie, Near-field fluorescence microscopy based on two-photon excitation with metal tips. *Physical Review Letters* **1999**, 82(20), 4014-4017.

1. Describe the aperture illumination technique including its advantages as well as its limitations.
2. Describe the essential properties of surface plasmon resonances and localized surface plasmon resonances?
3. Explain the term J-aggregates.
4. Explain the term Soret band.
5. Briefly explain the operation/use of each instrument component depicted in Figure 2.
6. Speculate about the reason(s) that the far-field contribution (without the metal tip) is much smaller in the spectrum of PIC J-aggregates than in the spectrum of *C. Reinhardtii* mutant photosynthetic membrane fragments (Figure 5).
7. Describe the noise that likely distorts the measurements described in this paper.
8. Use the citation links in the Web of science to find a paper that describes at least one limitation of the approach used in this paper and summarize the problem(s) it identifies.
9. List the references you used to answer questions 1 – 8.