

Homework #3

Due: 10/6/20

1. (20) Characterize the size of the NPs in the attached image providing detailed description of your chosen methods. What challenges did you encounter?
2. (20) How much longer would it take to collect NPs that are 5 nm in diameter compared with 50 nm in diameter using a centrifuge operating at 5,000g?
3. (20) Au NPs were surface functionalized with cysteine, an amino acid with a thiol ligand capable of binding to Au. TEM was used to measure that the mean (\pm standard deviation) diameter of the Au NPs was 10.0 (2.0) nm and, after fully digesting samples, ICP-OES was used to measure a mass ratio of S to Au of 0.02. Calculate the ligand density on the Au NPs as the number of cysteine molecules per Au NP (#/NP) and the number of molecules per Au NP surface area (#/nm²).
4. (20) Provide a citation and an image from a research paper, showing a “nano-shape” beyond than those described in lecture.
5. (20) Find a research paper that characterizes NPs using at least three of the techniques that were discussed in class. Provide a citation for the paper and briefly describe why each technique was or was not critical to the objective(s) of the study.