

### Synthesis of 4 nm MPA-coated AuNP

Adapted from Bozich, J. S.; Lohse, S. E.; Torelli, M. D.; Murphy, C. J.; Hamers, R. J.; Klaper, R. D. Surface Chemistry, Charge and Ligand Type Impact the Toxicity of Gold Nanoparticles to *Daphnia magna*. *Environ. Sci.: Nano* 2014, 1, 260–270, DOI: 10.1039/C4EN00006D

#### Supplies:

Milli-Q water

0.1 M H<sub>2</sub>AuCl<sub>4</sub>

0.1 M MPA

1.0 M NaOH

0.1 M NaBH<sub>4</sub>

Glassware and stir bar cleaned with aqua regia (3:1 HCl:HNO<sub>3</sub>)

#### Procedure:

1. To a 1 L flask was added 350 mL of Milli-Q water and 1.5 mL of 0.1 M H<sub>2</sub>AuCl<sub>4</sub>.
2. To the mixture was added 167  $\mu$ L of 0.1 M MPA for a ligand to Au ratio of 9:1. The mixture will be a bright yellow color. Then 1.4 mL 1.0 M NaOH to bring pH to 9. Stir for 10 min at ambient temperature.
3. While the mixture is stirring, make a new 10 mL solution of 0.1 M NaBH<sub>4</sub>.
4. After 10 min, add 10 mL of 0.1 M NaBH<sub>4</sub>, the solution will turn from yellow to wine red.
5. Stir at ambient temperature for 2 h.
6. Purify and concentrate by diafiltration with Pall Minimate 10 kDa MWCO TFF cassette (Note 10 kDa MWCO = retains greater than 1 nm in size)

#### 0.1 M H<sub>2</sub>AuCl<sub>4</sub>:

H<sub>2</sub>AuCl<sub>4</sub> 3H<sub>2</sub>O 393.83 g/mol

1.5 mL of 0.1 M = 0.0591 g in 1.5 mL

#### 0.1 M MPA

3-mercaptopropionic acid MW= 106.14 g/mol d= 1.218 g/mL

8.7  $\mu$ L MPA in 1.0 mL H<sub>2</sub>O

#### 0.1 M NaBH<sub>4</sub>

NaBH<sub>4</sub> MW=37.84 g/mol

0.0378 g in 10 mL H<sub>2</sub>O