

Plant Synthesis: Aloe Vera

Used to synthesize a variety of shapes including nanotriangles.

Protocol:

1. In a clean 100 mL beaker wrapped with aluminum foil to prevent light exposure, add a chosen volume of aloe vera plant extract:
 - Varying volumes ranging between 0.5mL - 4mL of aloe vera plant extract can be used to synthesize gold nanoparticles
 - The greater the volume of aloe vera extract used (eg. 1mL) the smaller the gold nanotriangles that will be generated
 - To synthesize nanoparticles to target size (less than 100nm), use 4mL of aloe vera extract
2. Measure 6-9.5 mL of ddH₂O (depending on the desired amount of garlic extract) using a graduated cylinder. Add this to a 25-40mL beaker.
3. Weigh out 0.00204g (2.0387mg) of chloroauric acid solid
 - CAUTION: oxidizes quickly - do not expose to air for longer than required
 - Do NOT use metal scoopula - use plastic/Teflon scoopula to transfer the solid
 - LIGHT SENSITIVE - use for short duration under light conditions
 - RAPIDLY add the measured chloroauric acid into the ddH₂O in the 25-40mL beaker
 - Parafilm the top of the beaker to seal it
 - Add a stir bar and place the beaker on a stir plate to dissolve the chloroauric acid
4. Using a 10mL graduated cylinder, measure between 0.5-4mL of garlic extract and add it to the chloroauric acid solution in the beaker to bring the volume up to 10mL - continue stirring throughout
5. Remove the beaker with solution from the stir plate and leave it covered with Parafilm in the dark or covered in aluminum foil (minimize light exposure of solution) in the biosafety cabinet for 30hr (reduction of gold occurs during this period)
 - At ~5hr in, remove the aluminum foil to check for a color change. The solution should appear **dark brown/purple in color** - indicator of nanoparticle synthesis (may test for color formation using UV spectrophotometer)
6. The nanoparticle solution can be stored between 4C - 20C
 - At temperature lying outside the range of 4-20C, the nanoparticles aggregate and become unstable
 - Storage of the solution in the 4C fridge is optimal
 - Store AWAY from direct sunlight
 - Do NOT freeze

Source: Chandran, S. P., Chaudhary, M., Pasricha, R., Ahmad, A., & Sastry, M. (2006). Synthesis of gold nanotriangles and silver nanoparticles using Aloe vera plant extract. *Biotechnol. Prog.*, 22(2), 577-583.