Protocol to synthesize CdSe QDs

1. In a 25 ml three necked flask (flask A) with a magnetic stirrer add:

    - 0.375 ml of Cadmium Oleate *(Cd(Ol)$_2$)* 0.5 M in oleic acid. This solution is solid at room temperature, heat it with a heat gun prior the synthesis. Melting point is around 60°C.
    - 0.65 ml of Trioctylphosphine Oxide *(TOPO)* technical grade (90%). This chemical is solid at room temperature, heat it with a heat gun prior the synthesis. Melting point is around 60°C.
    - 2.5 ml of Octadecene *(ODE)* technical grade.

2. Close flask A with the thermocouple, the refrigerant and a septum. Don't forget to grease the top of the flask's necks. Then, turn the vacuum on by opening the vacuum valve**.** You don't need to open the valve too much, and open it slowly.

3. Heat flask A up to 70°C, let it degas while stirring under vacuum for 25-30 min.

4. After degassing, put flask A under nitrogen by closing the vacuum valve and opening the nitrogen one. Then heat it to 300°C. Cover it with glass wool for insulation**.** Open the water valve to start the cooling systems.

5. During the degassing of flask A**,** take another 25 ml three-neck flask with a stirrer (flask B).

6. Purge flask B**.** To do so, put it under vacuum, then under nitrogen. Repeat this process. Make sure you never open the two valves at the same time.

7. To flask B (under nitrogen) add:

    - 2 ml of Oleyamine.
    - 2.66 ml of a Selenium solution in Trioctylphosphine (Se-TOP) 1M. This solution is kept under nitrogen atmosphere because it oxidizes quickly when exposed to air. Make sure you close the container and put it back quickly in the glove box when using this product.

8. Put flask B under vacuum, then heat to 40-45° to make sure everything is in solution. Don't go too high on the temperature of this solution. Let flask B degas for 15-20 min, then put it back under nitrogen.

9. When everything is degassed and at the good temperatures, take 3.5 ml of the solution in flask B and add it to flask A in one quick shot. The temperature will drop at around 220-230° and the solution's color will change from colorless to red**.**

10. Keep the glass wool to insulate the system. Let the temperature go back to 280°C

(keep the controller set at 305°). Once it has reached 280°C, let it stir for 4 minutes (you can now set the controller at 280°.

11. After the 4 minutes, remove the heating mantle from the flask (set the controller back at 0-20°C) and let it cool down to room temperature. The solution will go from a dark brown to red.

12. When the mixture has reached 70°C or less, transfer it into four 15 ml conical. centrifugation tubes. Add ethanol to each tube to fill them to 12 ml and shake well. Fill four other centrifugation tubes with ethanol for balancing the centrifuge.

13. Centrifuge those tube 10 min at 10000 rpm. Remove the supernatant and disperse quantum dots into a total volume of 5 ml of hexanes. You should obtain a dark red transparent solution that fluoresces yellow under UV light.

14. Clean everything! Use hexane to rinse all your glassware. Be cautious, hexane is not dangerous but can be harmful with direct and repeated exposure, its structure is comparable to gasoline. Make sure you wear gloves every time you handle it.

15. Put your used flask in the base baths. Those are dangerous and corrosive to skin, make sure to use the big black gloves and the pliers to put them in and out. Let them in the bath until the next day then rinse them with water and dry them with acetone.

16. Clean your working surface with hexane and acetone.