

Nanocrystalline Solar Cell

Student Instructions

It is important to follow proper lab safety protocol with this activity. Wear goggles and gloves at all times.

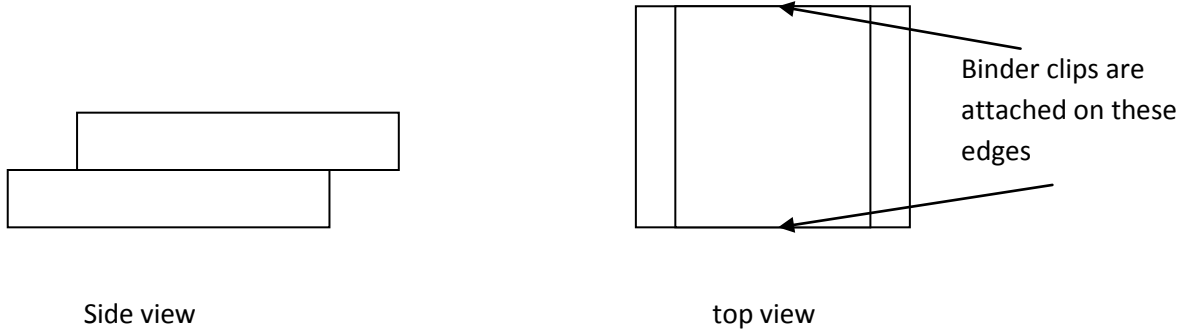
Materials

- TiO₂ coated slide
- 4 Blackberries or raspberries
- Petri dish
- DI water
- Isopropanol
- 2 alligator clips
- Multimeter
- Carbon pencil or open flame
- Clean conductive glass slide
- Strainer or cheesecloth
- Fork
- 2 -3/4" binder clips
- Kimwipes
- Triiodine solution or triiodide tincture

Directions

1. Mash up the berries with a fork in the bottom of the petri dish.
2. Strain the berries with the cheesecloth or strainer into the top of the petri dish.
3. Place the TiO₂ coated slide face down in the berry juice to dye the TiO₂. The slide should be left in the berry juice for 5 minutes.
4. While the TiO₂ slide is being dyed, prepare the other glass slide.
5. Using a multimeter, set to measure ohms (200 Ω), find out which side is conductive. One side will read [1 .] which is not conductive, while the other slide will read a number usually between 10-30. The side that reads a number is conductive.
6. Apply a layer of carbon to the conductive side of the glass slide. This can be done with a carbon art pencil or you can pass it through a Bunsen burner flame until it is covered in soot.
7. The other TiO₂ slide should now be ready to be rinsed off. Rinse off with DI water to remove any excess berry juice and follow with isopropanol to remove any other impurities. Blot dry with a Kimwipe.
8. Place 3-4 drops of the electrolyte solution on the TiO₂ slide.

9. Assemble the two slides together by placing them so that the dyed TiO_2 and carbon are both on the inside making contact with each other. The slides should also be offset so that they can act as electrodes and the alligator clips can attach to them. See diagram below.



10. Secure the slides together with binder clips on the flush edges.
11. Attach an alligator clip to each of the offset edges of the solar cell.
12. Attach the other end of the alligator clips to a multimeter.
13. Take the solar cell outside and take a voltage and amperage reading. Set your multimeter on the 20V setting and the 20mA.