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Add about 15 mL of water in 1 ml  increments while continuing to grind. 5. Add more water if necessary. 6. Add a small drop of a surfactant,  like clear dish detergent, with 1 mL of water. 7. Store in dropper bottle, carefully  not to mix up the solution, as to form bubbles. 8. Allow the bottle to sit for about  30 minutes before using.     **II. Counter Electrode Carbon Coating**       1. Take one Sn02 coated glass plate.  Use a multimeter to figure out which side is the conductive side.  You will want to apply the carbon on the conductive side. 2. Light candle, and hold glass  closely to the candle flame with tweezers. 3. This allows the soot (carbon) to  build up on the glass, you need to move the glass around so that it  is evenly coated. 4. Alternatively cover with carbon  from a pencil or carbon rod. 5. This serves as a catalyst for the  triiodide to iodide reaction. 6. If you choose you can try to  anneal the carbon when you anneal the Ti02 coated plate.     **III. Deposition of the Ti02 Film And Annealing**       1. Obtain and clean one Sn02 coated  glass plate, rising in ethanol to clean, and dry with soft tissue. 2. Use a multimeter to check for the  conductive side of the glass plate. 3. Tape down the Ti02 plate  conductive side up with two strips of tape, masking only about 1 mm. 4. Tape down with one more strip of  tape the the end, masking 4 to 6 mm of the glass. The masked area will be used to attach clamps for the electrical connection. (The  thickness of the tape allows for a 40-50 micron thick Ti02.) 5. Place about one drop (5  microliters per square centimeter) of the Ti02 suspension. 6. Quickly slide a clean glass  stirring rod horizontally over the plate, back and forth over the  plate, do this until the surface looks uniform and even, if this doesn't work, whip off the Ti02 with a damp cloth, and repeat step  5. 7. Allow the plate to dry for a few  minutes. 8. Anneal the Ti02 film by placing   the conductive glass on a ring stand under a Bunsen burner for  10-15  minutes. Or for home, place on aluminum foil and set in  BBQ on high for about 15-20 minutes. 9. Allow to cool SLOWLY to room  temperature as to avoid cracking. Store these is an enclosed place  to avoid getting dirty.   (I quickly turned the Ti02 dropper upside down to avoid getting the top bubbles in the drop)      **IV. Preparing the Chlorophyll Dyes**    Warning, Do not use plastic cups!   1. Grind fresh leaves with about 20+  ml of acetone. Continue doing this until the acetone is a dark  green. 2. Use a coffee filter to filter this  into light proof bottle. 3. Place several pieces of leaves in  the bottle. 4. Place the Ti02 coated glass plate,  that has been annealed, in the bottle. Add additional acetone to the  bottle, if needed, till it covers the glass plate. Allow to react  for 24 hours.         **V. Preparing the Anthocyanin Dye**         1. Crush 5-6 fresh berries in about  4-5 ml of deionized water. 2. Filter solution into light proof  bottle. 3. Place Ti02 coated plate into  filtered juice. 4. Allow to soak for about 10-15  minutes 5. If white is still visible place in  juice for another 5 minutes. 6. When done wash film gently in  water, then in alcohol. 7. Blot dry 8. If it won't be used right away  place back in juice.   **VI. Assembling Cell**       1. Remove the Ti02 coated plate from  the dye, blot dry. 2. Carefully place the counter  electrode on the other side of it, so that the Ti02 side faces the  carbon side of the counter electrode, leaving the non-Ti02 area  exposed, this will be your area to clamp an electrical clamp too. 3. Attach binder clips to the edges. 4. Place one or two drops of iodide  electrolyte at one end. 5. Alternately open and close each  clamp and help allow the electrolyte to move uniformly in the cell.       **VII. Testing a Cell**   1. Attach alligator clips to each  hang over, the Ti02 side will be the - and the counter electrode  side will be the +. 2. Attach clips to multimeter (a  device used to measure current, resistance and voltage) 3. Set multimeter to Volts DC and  move cell around till you get the high number, record that number. 4. Set multimeter to Current DC and  move cell around till you get the highest number, record that  number. 5. Set multimeter to resistance,  cover the cell so it is dark, and record this resistance. (The  resistance measurement is made to help diagnose any cell faults.) |  |  |  | | --- | --- | |  |  | |  | [[Electrifying The Sun](http://docs.google.com/index.html)] [[Introduction](http://docs.google.com/Introduction/introduction.html)] [[Hypothesis](http://docs.google.com/Hypothesis/hypothesis.html)] [[Experiment](http://docs.google.com/info/info.html)] [[Pictures](http://docs.google.com/Pictures/pictures.html)] [[Data](http://docs.google.com/data/data.html)] [[Conclusion](http://docs.google.com/Conclusion/conclusion.html)] [[Recommendations](http://docs.google.com/Recommendations/recommendations.html)] [[Bibliography](http://docs.google.com/Bibliography/bibliography.html)] [[Experiment Log](http://docs.google.com/Experiment_Log/experiment_log.html)] [[Acknowledgments](http://docs.google.com/Acknowledgments/acknowledgments.html)] | |