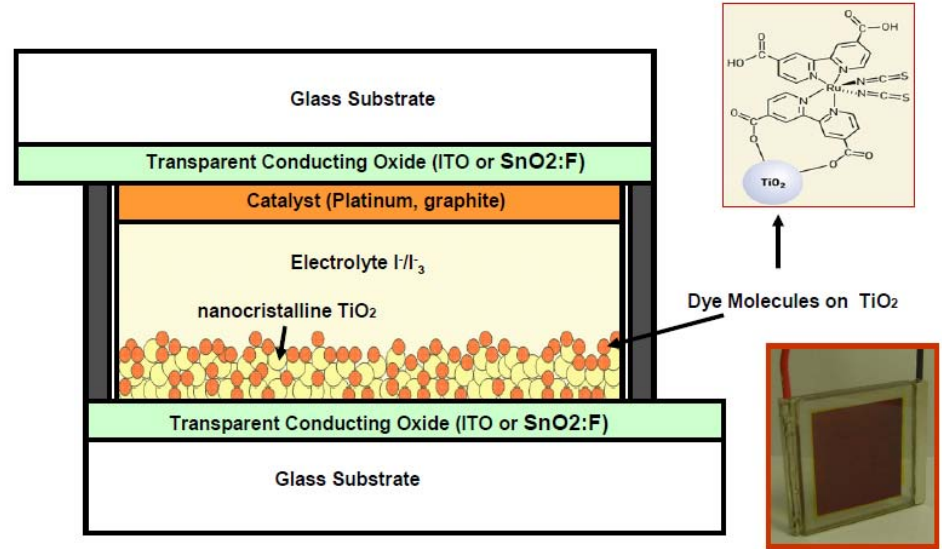
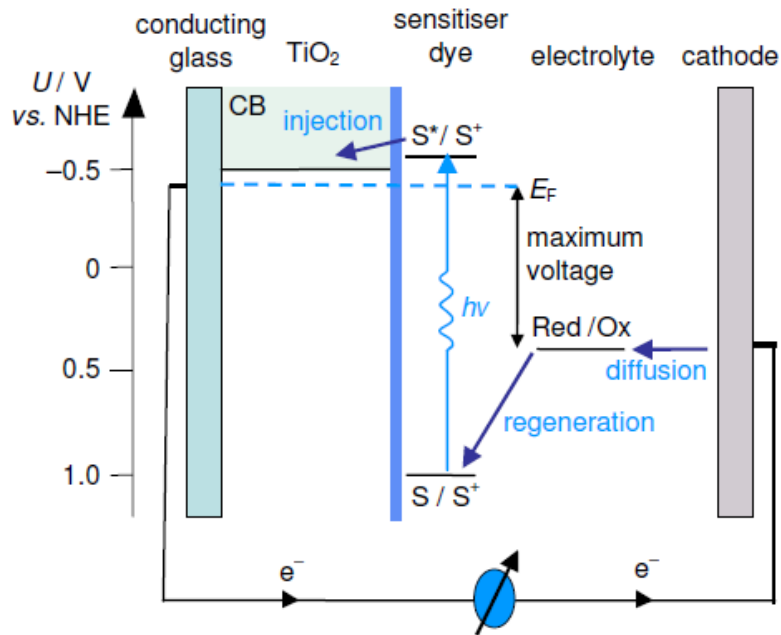
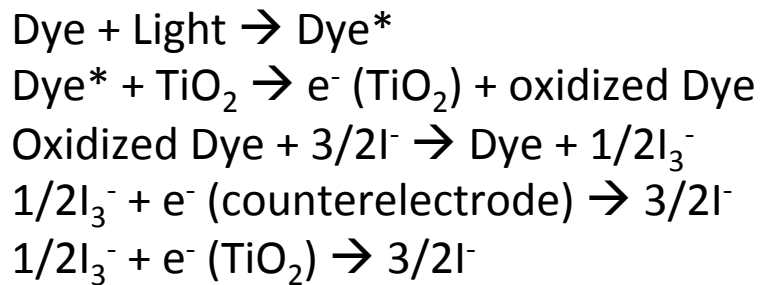


Lab #10 Organic PV

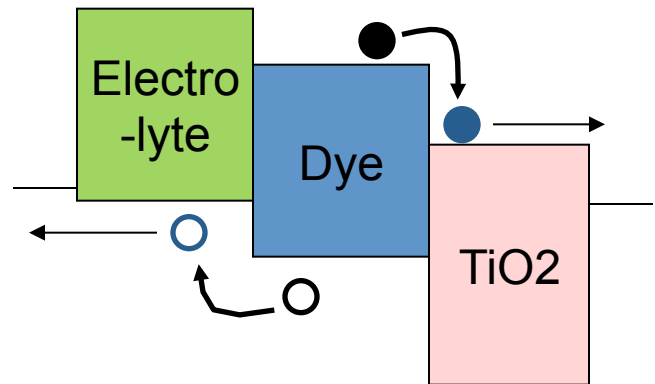
Grätzel Cell



¥ "gci fWg'i b_bck b""5""f[\hg'fYgYfj YX""HV]g'WëbhYbh]g'Yl Wl XYX'Zfca 'ci f'7fYUhh] Y
7ca a cbg'']WbgY"": cf'a cfY']bZcfa Uhjcbz'gyY'\hd. ##cVW "a]h'YXi #ZU]fi gy"



Need interface to maximize exciton dissociation



Organic Solar Cells

Indium tin oxide is a solid solution of indium oxide (In_2O_3) and tin oxide (SnO_2).

It is transparent and colorless in thin layers and is one of the most widely used conducting oxides because of its electrical conductivity and optical transparency.

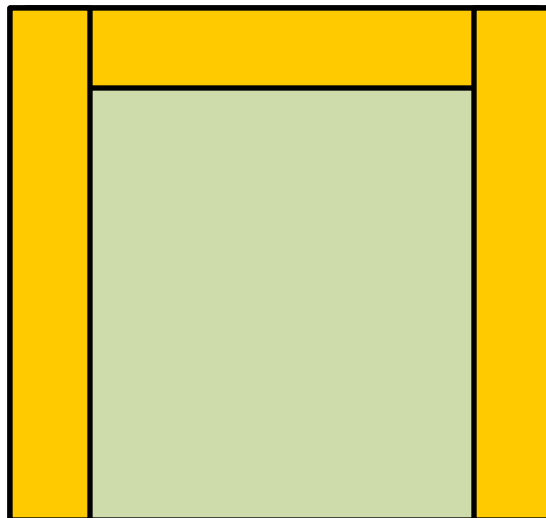
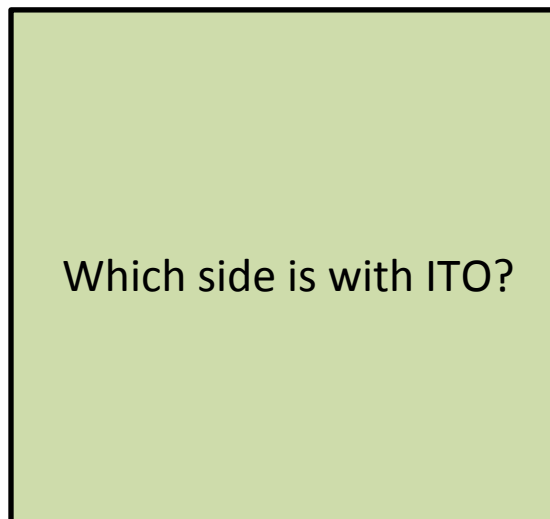
With the conducting side up, tape the glass on three sides.

Wipe off any fingerprints or oils using a tissue wet with ethanol.

Opposite sides of tape will serve as a spacer so the tape should be flat and not wrinkled. The third side of tape gives an uncoated portion where an alligator clip will be connected.

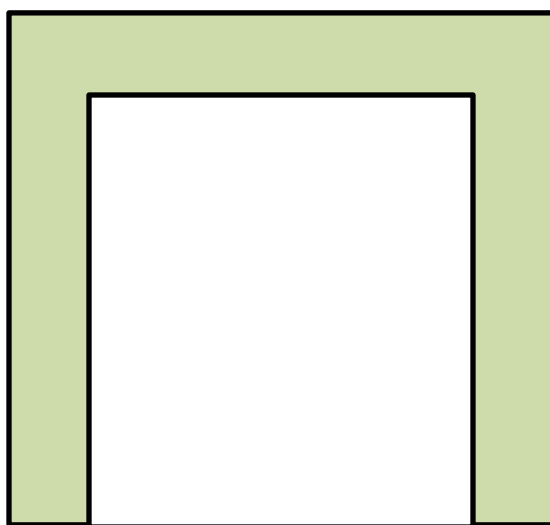
Nanocrystalline titanium dioxide (TiO_2) + dilute acetic acid + Triton X-100 surfactant or clear dishwashing detergent.

Add some of the titanium dioxide suspension and quickly spread by pushing with razor blade or microscope slide.

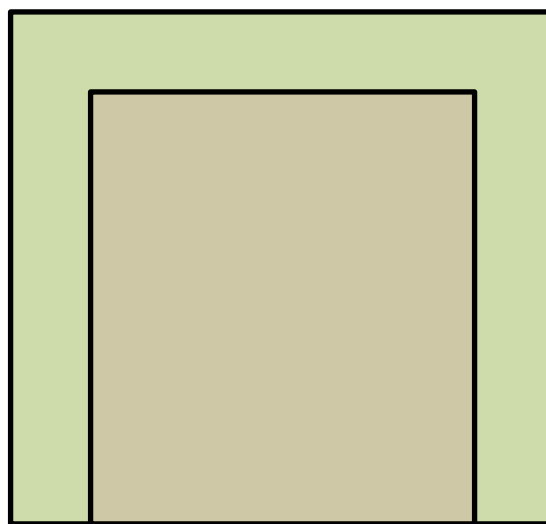


Organic Solar Cells – Top Electrode

Carefully remove the tape without scratching the TiO_2 coating.

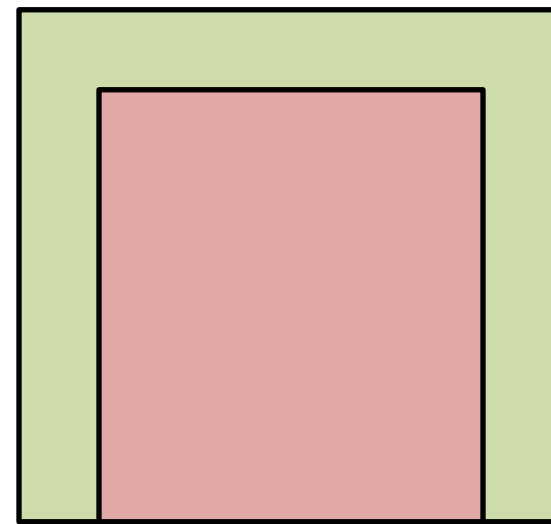


Heat the glass on a hotplate (450 C) in a hood for 30 minutes. The surface turns brown as the organic solvent and surfactant dries and burns off to produce a white or green sintered titanium dioxide coating.



Immerse the coating in a source of anthocyanins, such as raspberry juice.

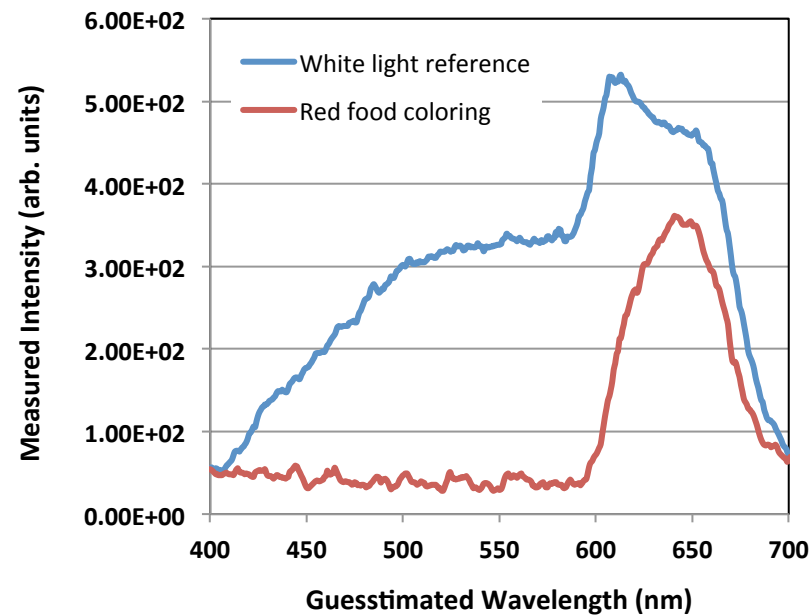
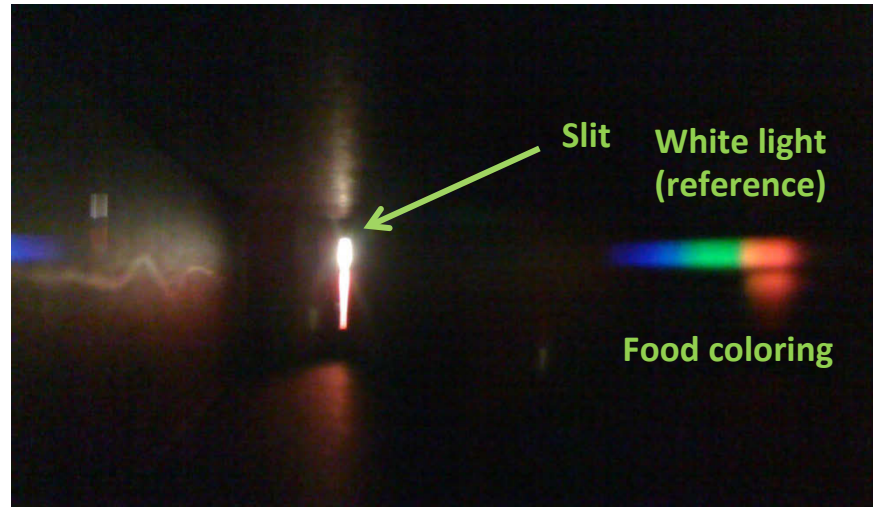
Rinse gently with water to remove any berry solids and then with ethanol to remove water from the porous TiO_2 .



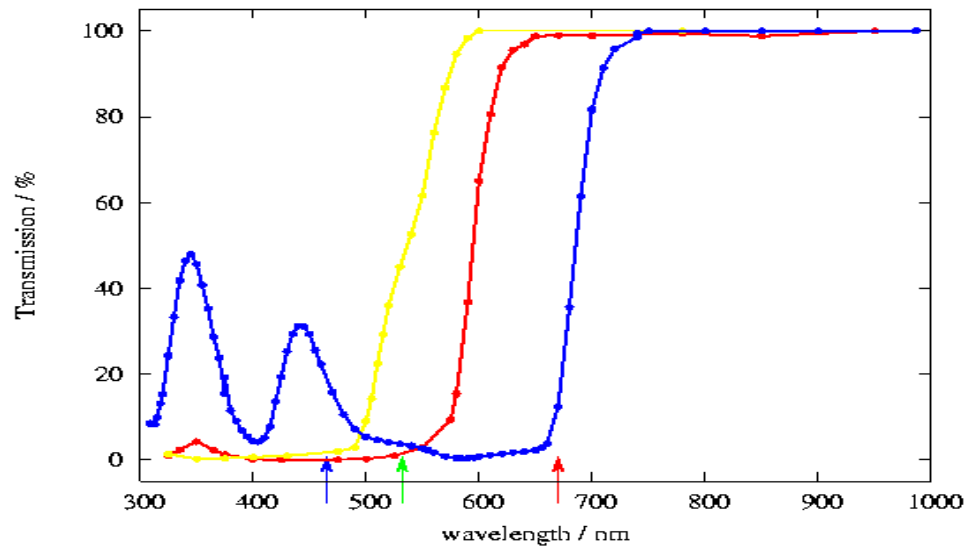
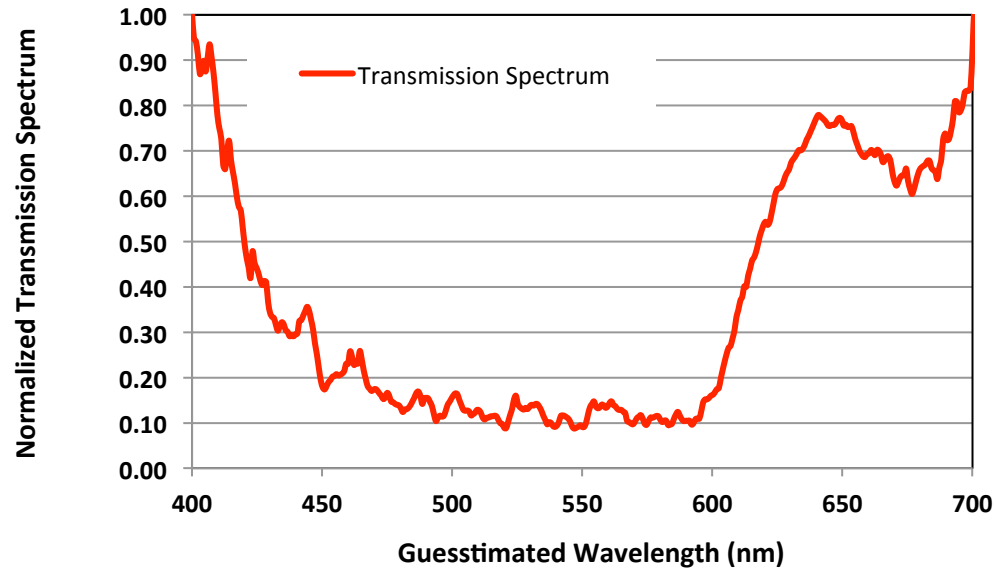
Transmission of Food Coloring Dyes



Interested, but easily distracted grad student measuring the transmission spectrum of red food coloring



Transmission of Food Coloring Dyes



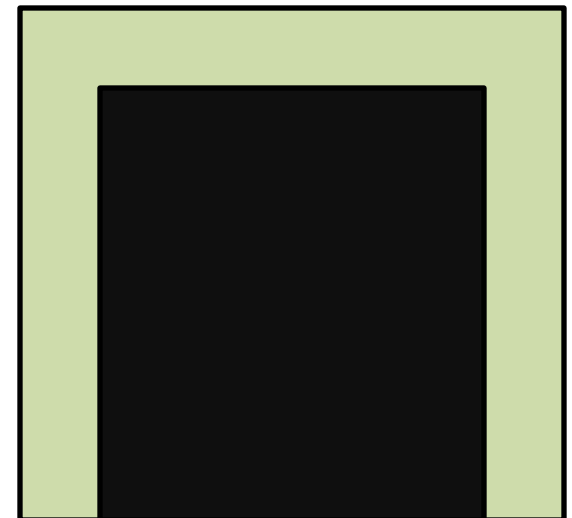
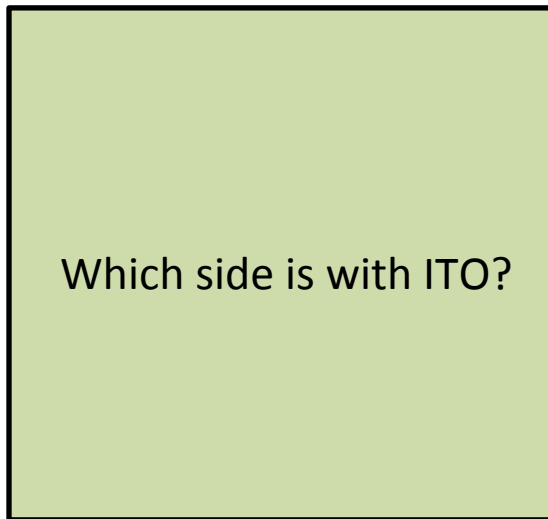
Organic Solar Cells – Bottom Electrode

Indium tin oxide is a solid solution of indium oxide (In_2O_3) and tin oxide (SnO_2).

It is transparent and colorless in thin layers and is one of the most widely used conducting oxides because of its electrical conductivity and optical transparency.

Pass a second piece of tin oxide glass, conducting side down, through a candle flame to coat the conducting side with carbon (soot). For best results, pass the glass piece quickly and repeatedly through the middle part of the flame.

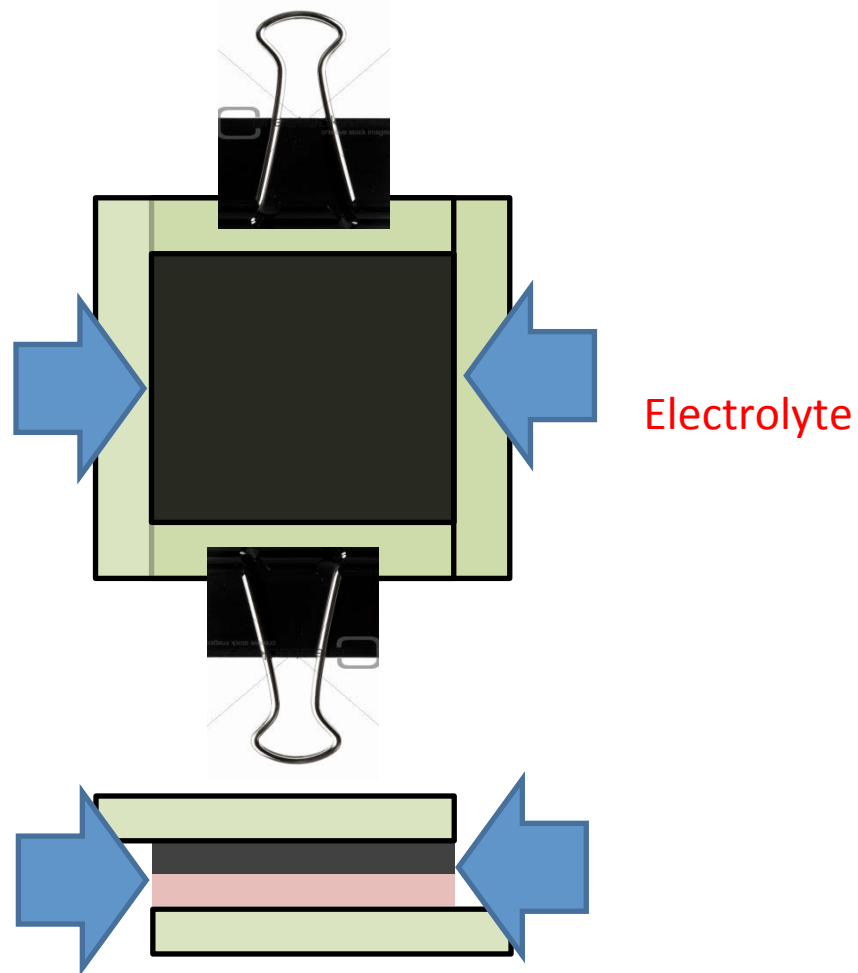
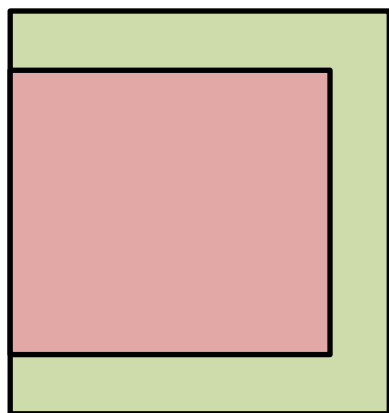
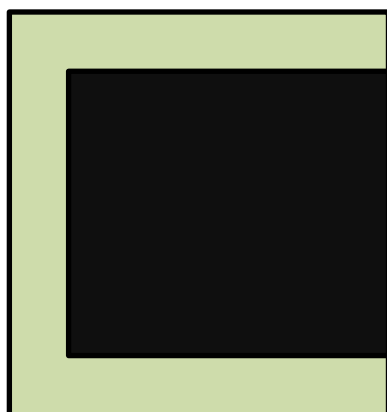
Wipe off the carbon along the perimeter of three sides of the carbon-coated glass plate using a dry cotton swab.



Organic Solar Cells

Assemble the two glass plates with coated sides together, but offset so that uncoated glass extends beyond the sandwich. Do not rub or slide the plates. Clamp the plates together.

Add a few drops of a triiodide solution to the edge of the plate. Capillary action will cause the KI_3 solution to travel between the two plates.



Organic Solar Cells



D:\chc\W&i fhYgmicZ\c'1 b'gcb['cb': ']\V_f"

Q1: Did your solar cell work? Current? Voltage?

Q2: How much power is produced?

Q3: How could you improve the efficiency?

MIT OpenCourseWare
<http://ocw.mit.edu>

6.S079 Nanomaker
Spring 2013

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.