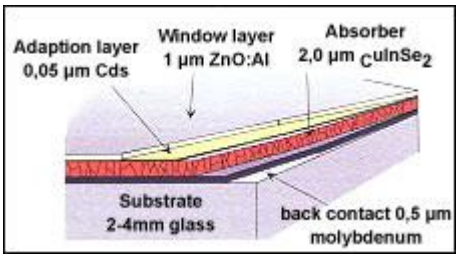
Copper Indium Selenide (CIS) Solar Cell

CIS cells are made with a thin layer of $CuInSe_2$ on plain glass or flexible metal backing. Another common variation of this cell is the copper indium gallium diselenide CIGS. CIS cells haves up to 14% efficiency with similar durability as silicon solar cells. Since they are a thin film technology they can be less costly than Si cells. These cells have and open circuit voltage of 5 V DC and a short circuit current of 95mA. Maximum power is 3.9V and 64 mA (.25 watts)



Positive + (Red)

Negative + (Black)

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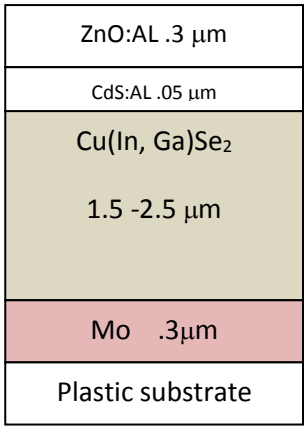
Copper Indium Gallium Selenide (CIGS) Solar Cell



CIGs cells are made with a thin layer of copper indium gallium diselenide $Cu(In, Ga)Se_2$ (CIGS). CIGS cells have up to 10% efficiency with similar durability as silicon solar cells. Since they are a thin film technology they can be less costly than Si cells. This WAVESol panel from Ascent Solar has an open circuit voltage of 14 VDC and a short circuit current of 290 mA. Maximum power is (3 watts).

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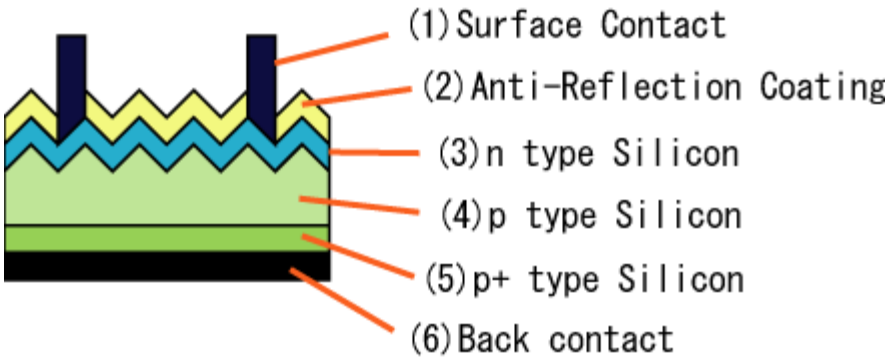
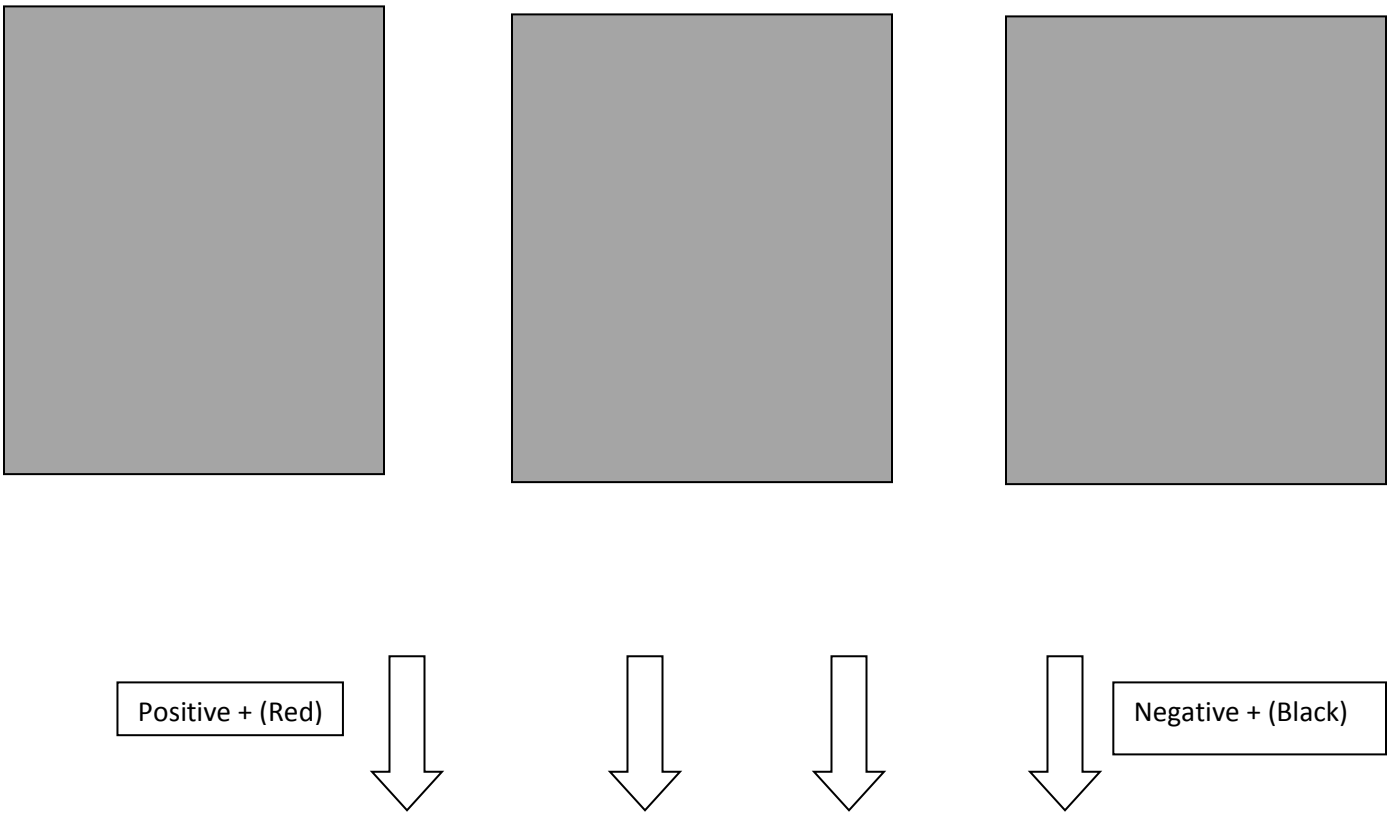
Crystalline Silicon (Si) Solar Cell

Silicon solar cells are made of the same highly refined wafers that are used to make computer chips. Monocrystalline silicon consists of a single highly organized crystal. They have the highest efficiency of up to 16%. They are very durable with respect to sun exposure, but are brittle and expensive. These cells have and open circuit voltage of .45V DC and a short circuit current of 400mA.





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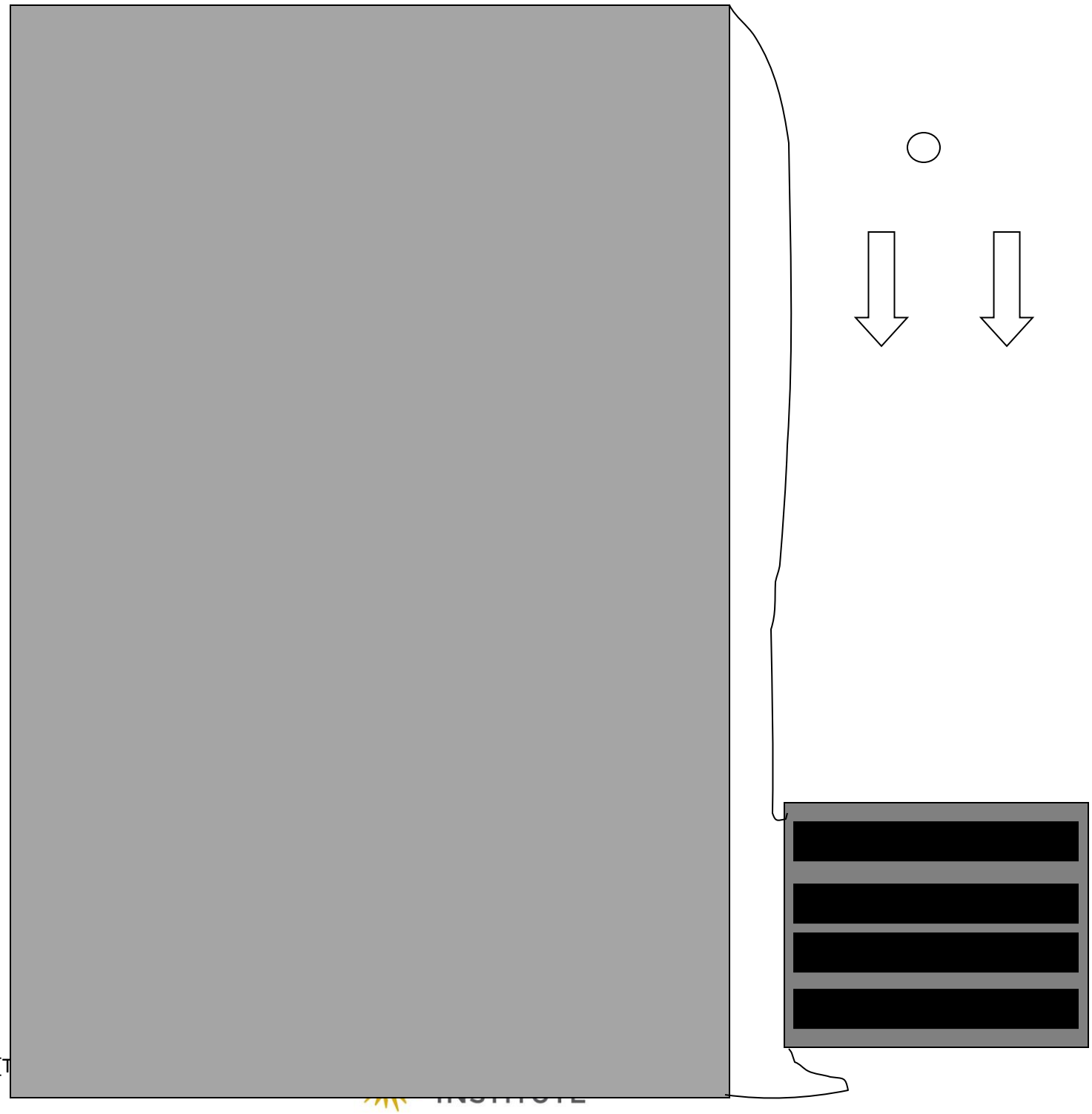
Amorphous Silicon (a-Si) Solar Cell

Amorphous silicon solar cells are made from a layer of silicon deposited as thin film on a plastic backing. The silicon atoms are disorganized and do not form perfect crystals, and have a comparatively low efficiency of up to 5-8%. They tend to degrade with long sun exposure but they are flexible and inexpensive to produce. This ThinFilm panel from Silicon Solar Inc., has a 7.2V DC and a short circuit current of 200mA (1.44 watts).



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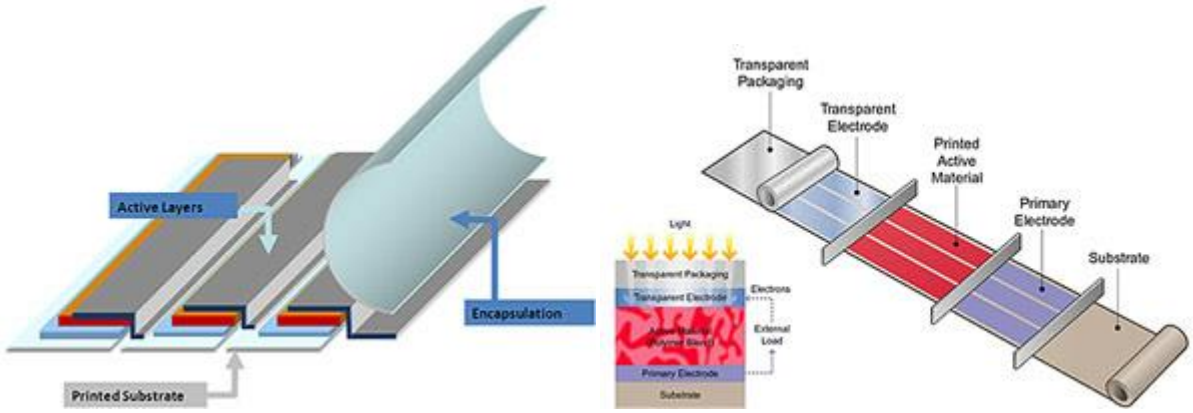
Plastic Solar Cell - Organic Photovoltaic (OPV)



Organic photovoltaics are comprised of several thin layers of carbon-based molecules. The active material is an organic polymer that absorbs light, separates charges, and causes current to flow. The active layer is sandwiched between a transparent conductor, metallic conductors and airtight packaging material. They have a low efficiency of 3-5%. Improving this is an area of active research.

The advantage of organic or plastic solar cells is that they have the potential of extremely low material and manufacturing cost, and they are flexible. A disadvantage is that organic materials have a limited lifetime especially in full sun or exposed to water and oxygen.

The Konarka Power Plastic is one of the few commercially available OPV panels. This Power Plastic 320 Solar Charger is rated at 3.9 watts and 8 volts in full sun.

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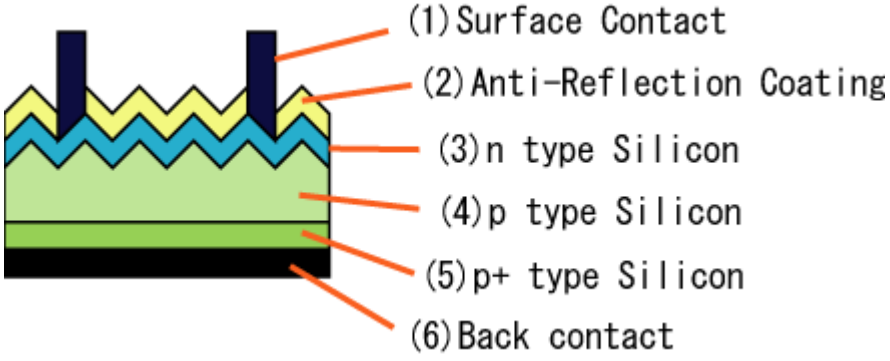
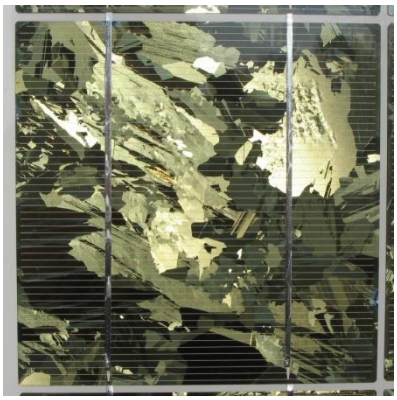
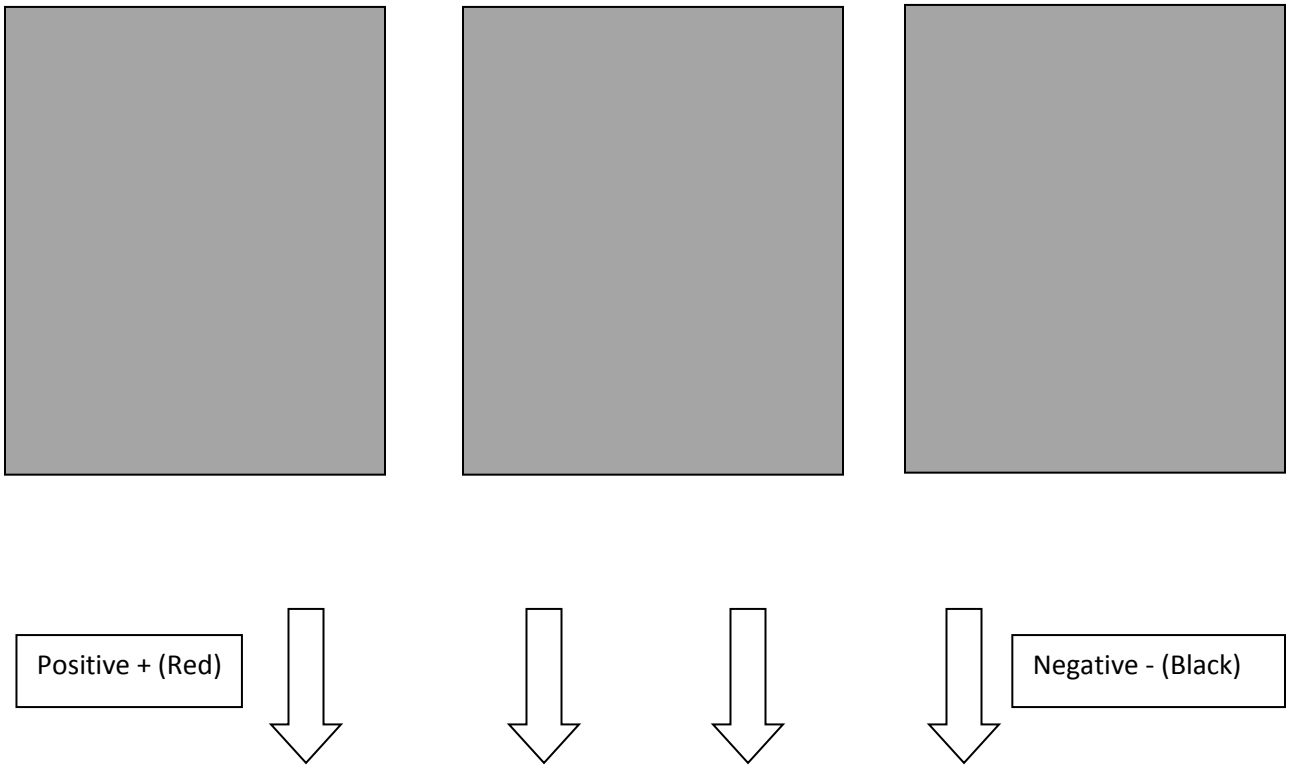
Polycrystalline Silicon (poly-Si) Solar Cell

Polycrystalline silicon solar cells are made of lower grade silicon ingots that form multiple crystal domains as they cool. These cells can be made square and therefore can be more densely packed than cells made from round crystalline ingots. The poly-Si material is cheaper than single crystal silicon but still has an efficiency of up to 14%. They are durable with respect to sun exposure, but brittle and somewhat expensive. These cells have an open circuit voltage of .5V DC and a short circuit current of 155mA.







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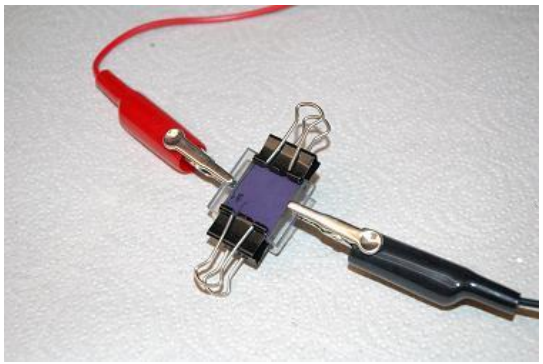
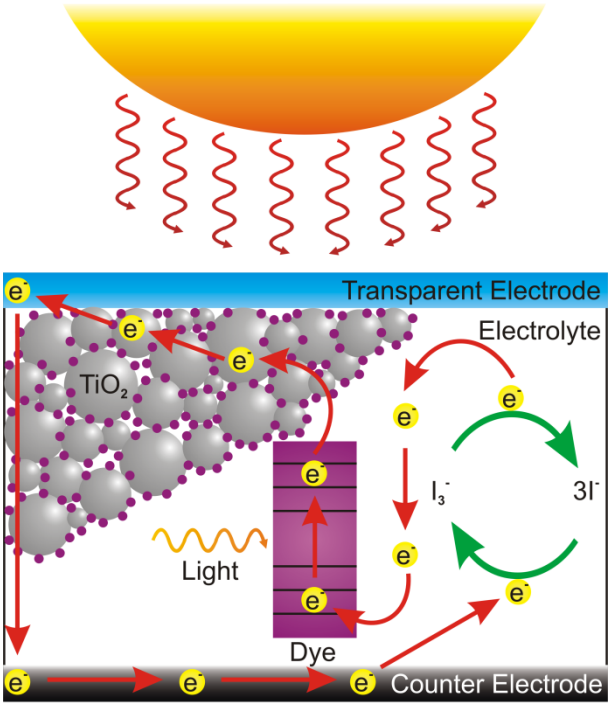
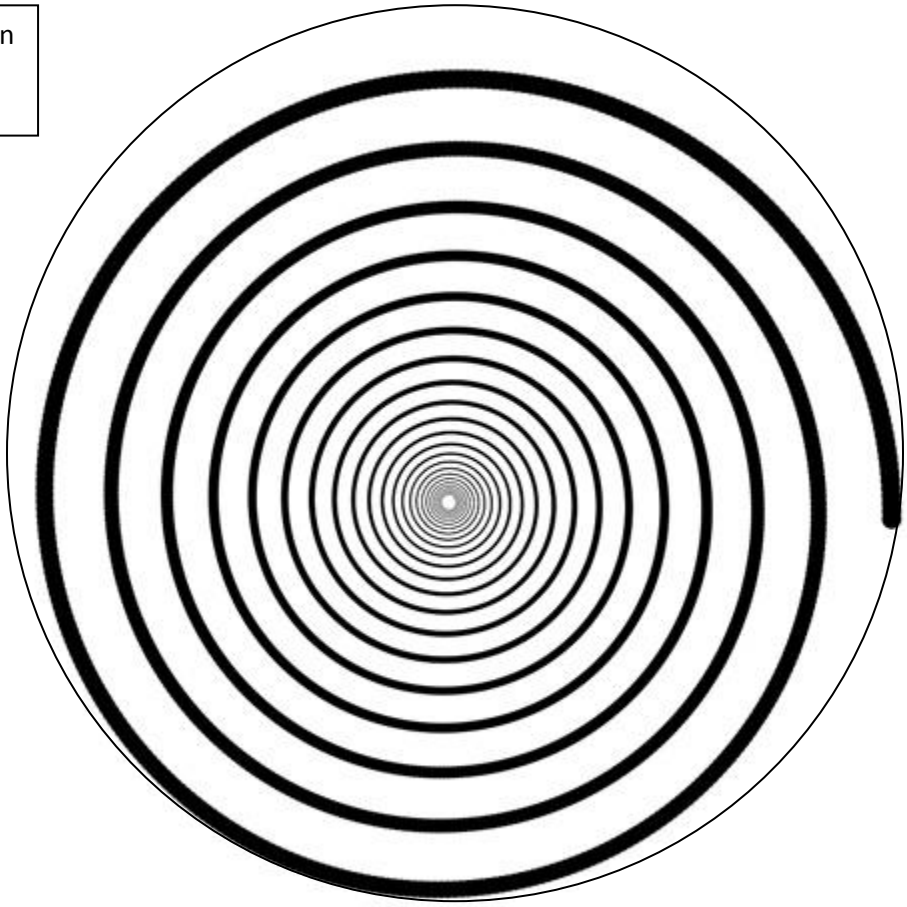
Dye Sensitized Solar Cell- (Graetzel Cell)

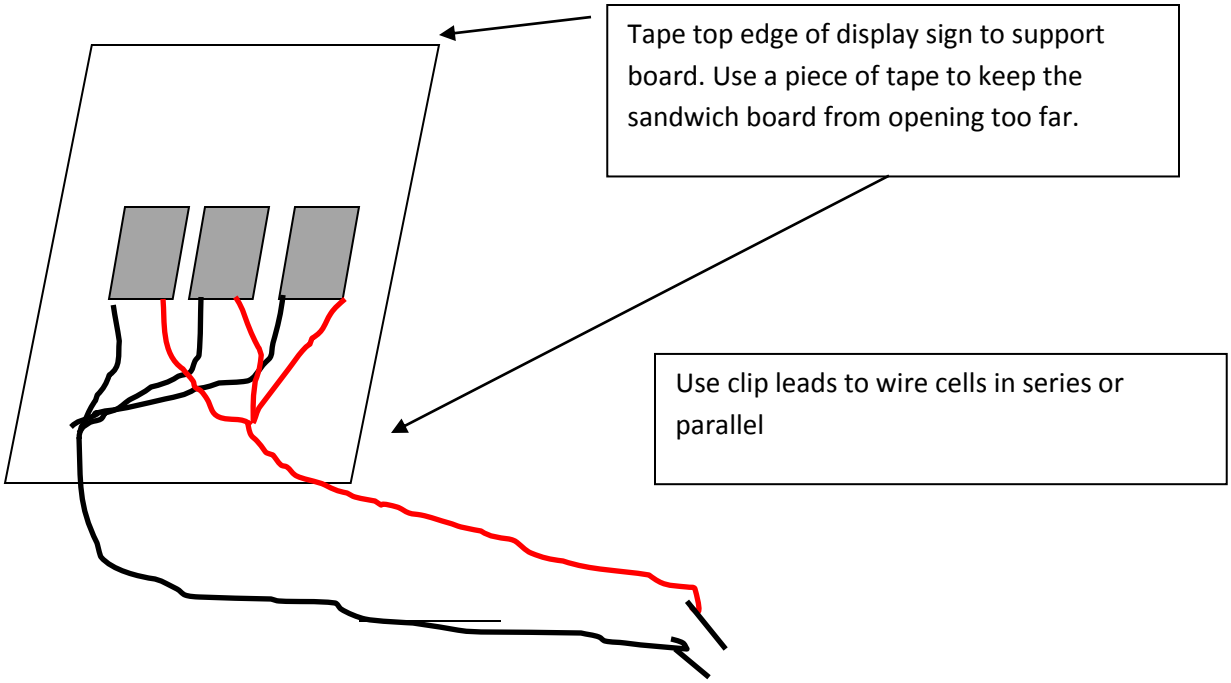
This experimental cell (Graetzel Cell) is made by with a layer of Titanium Dioxide TiO_2 that has absorbed natural dye anthocyanin pigment from a raspberry. Iodide solution provides a means of transferring electrons into the dye. This cell produces .4 volt but very low amperage. Some manufacturers are trying to build large scale Graetzel cells using special pigments and sealed liquid chambers. Durability and sealing are challenges to this technology.





Mount this spiral on a CDROM disc and then attach this to the motor for the display.





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Sources for Cells

Small solar cSi solar cells

http://www.scientificsonline.com/product/low-cost-high-output-encapsulated-solar-cells-100ma $5.95

http://www.amazon.com/Weiheng%C2%AE0-35w-10a70-Solar-Module-Charger/dp/B00LTEG7CQ/ref=sr_1_58?ie=UTF8&qid=1423170524&sr=8-58&keywords=monocrystalline+silicon

Polycrystalline pSi solar cells

http://www.pitsco.com/Solar_Mini_Panels $3.95

CIS solar cell

http://www.goldmine-elec-products.com/prodinfo.asp?number=G16394 $3.50

Amorphous Silicon- 6x6 on glass

http://www.goldmine-elec-products.com/prodinfo.asp?number=G17851 $8.95

Amorphous Silicon on plastic Power Film

http://www.scientificsonline.com/product/solar-cell-thin-film-6v $12.95

http://store.sundancesolar.com/powerfilm-7-2v-200ma-flexible-solar-panel-mp7-2-150/ $37.95

CIGS flexible panel from EnerPlex

http://www.goenerplex.com/products/all-products/kickr/kickr-i $39.95

motor for spinner

http://www.goldmine-elec-products.com/prodinfo.asp?number=G18050 $1.49