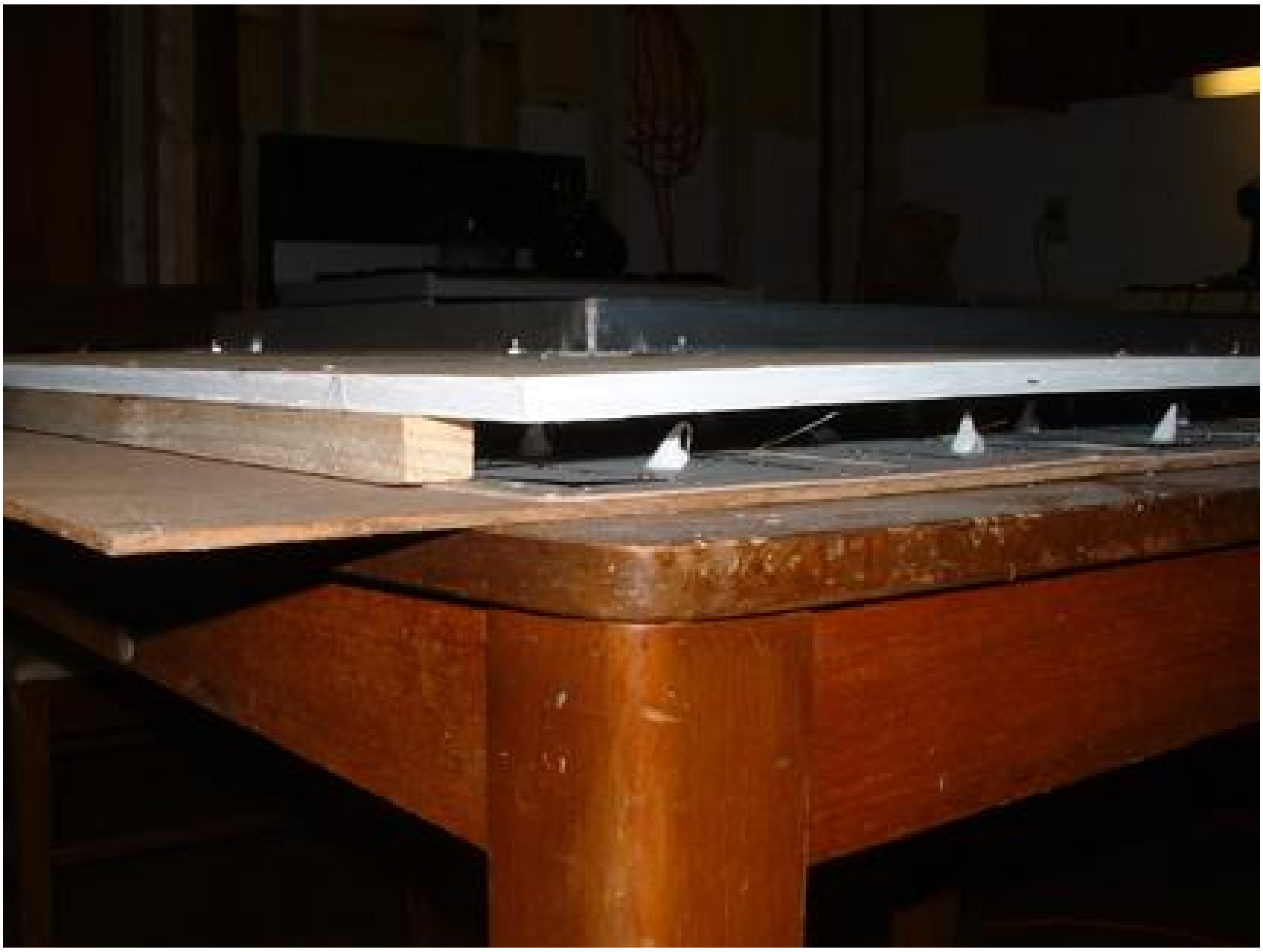
Homemade Solar Panels

This is the fabrication technique that has evolved out of my trials and errors. I'm sure there are many different ways to build solar panels that would work just fine.
I have tried to keep mine as simple as possible.

This shows the cells upside down in a jig made from strips of mat board stapled onto a piece of 1/4 inch plywood. At this point, the tabs can be soldered to the cells. I found a 30 watt iron to be the minimum acceptable and a low temperature solder to be the best.

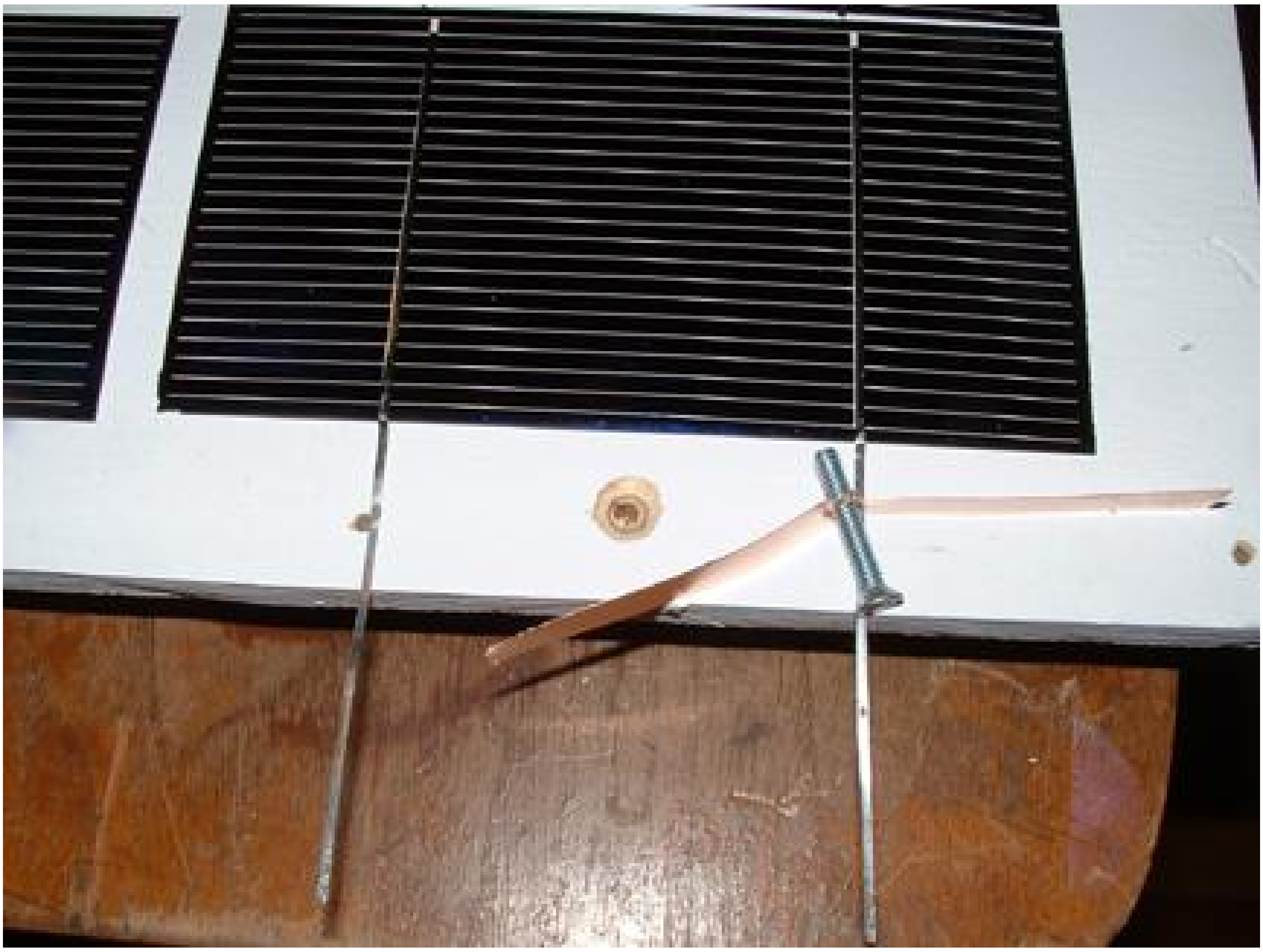
Here the cells are all soldered and a dab of silicone caulk is placed on each one.

I used 1/2 inch plywood for my backing. It sits atop spacers as I align it with marks on my jig. When it is in the right position I remove the spacers and let it press into the silicone. You may be able to make out the 1 x 1 x 1/16 inch aluminum angle stock that's bolted to the upper face of the plywood. The angle stock is bent into an 'L' shape and two of them are set to form a rectangular shape and bolted down. The metal adds a great deal of stiffness to the plywood.

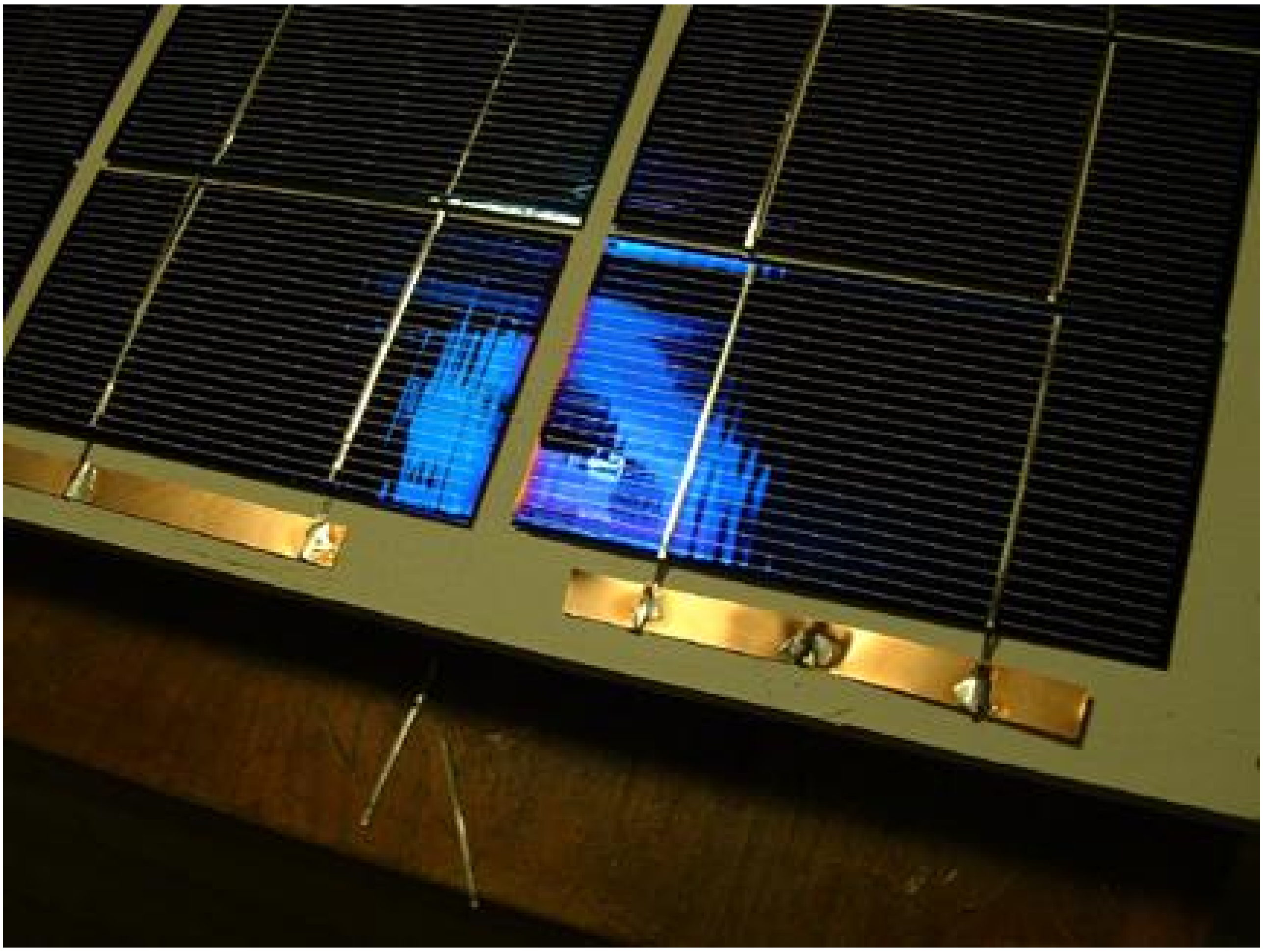


The next step is to flip the rig over. This can be tricky, but I find using two small C-clamps opposite each other holds the backing and the jig together just enough to let me flip it over without any of the cells moving on me. Here is the new panel with the jig removed.

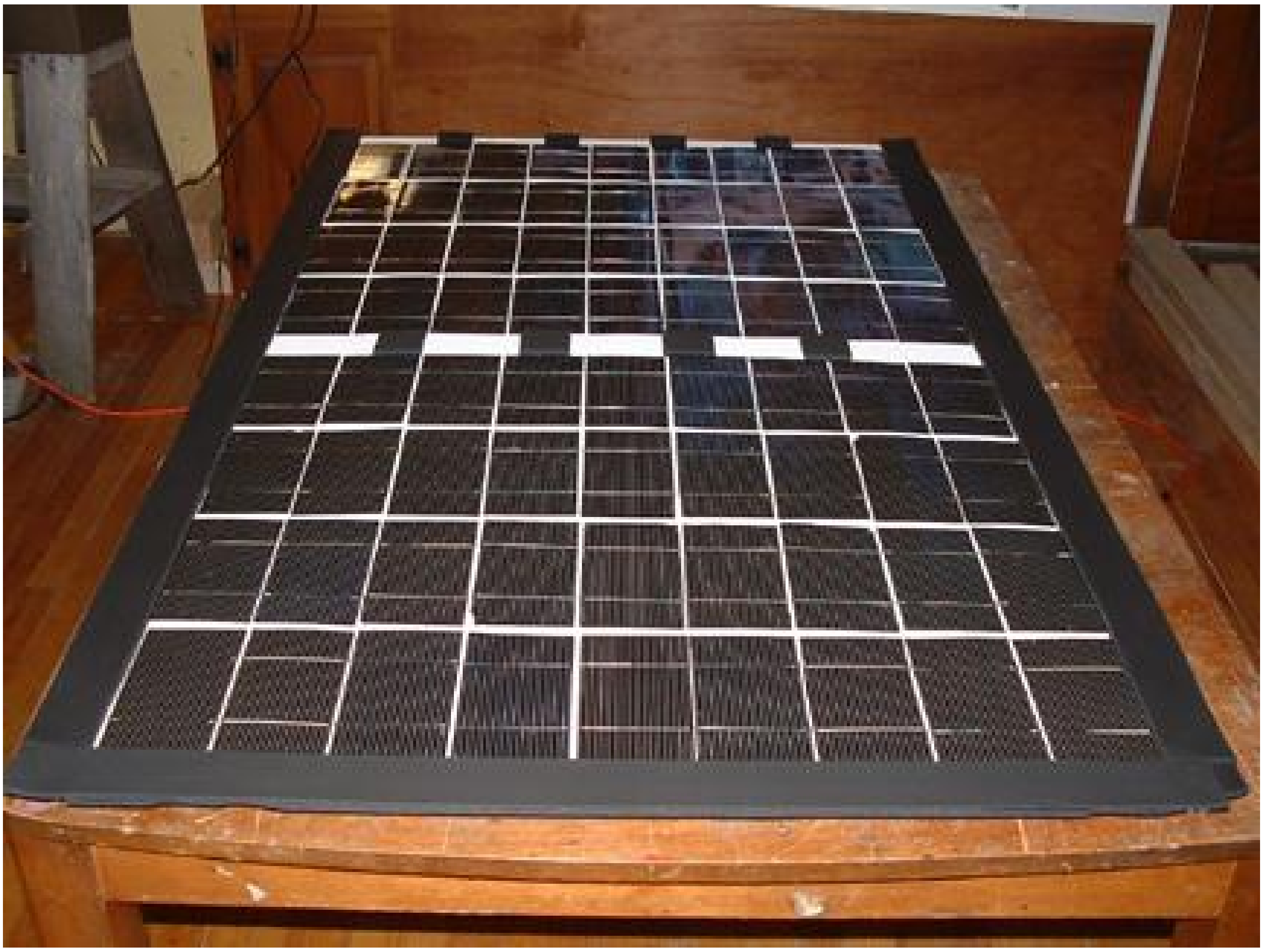
Power is brought to the back of the panel using bolts counter sunk into the plywood. The copper strip is .015 copper sheet purchased on-line and cut up into strips.



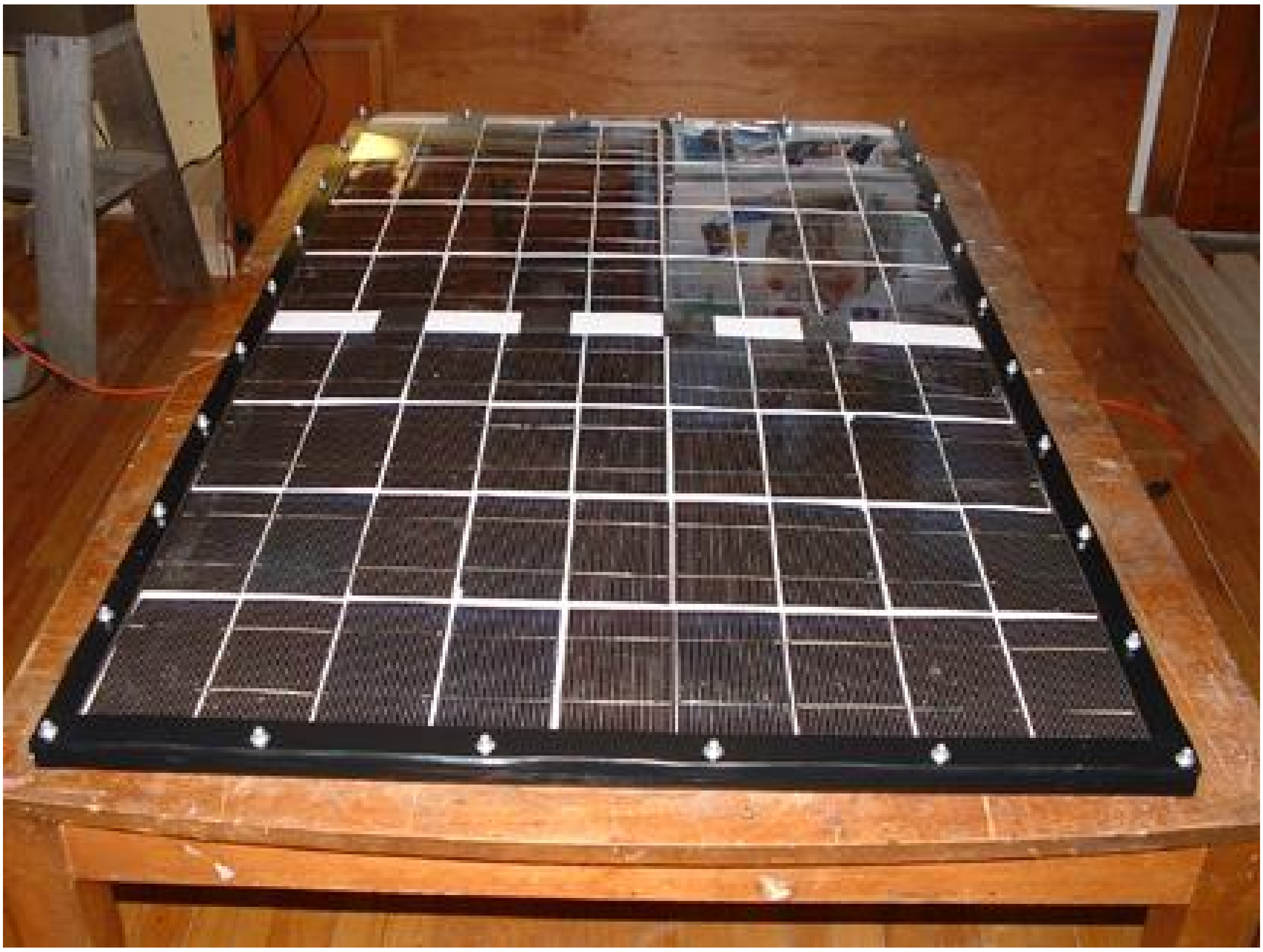
The terminal bolts are soldered to the copper strip to ensure a good connection. The copper is also used to string the rows of cells together at the ends.



A double layer (total thickness about 1/4 inch) of foam tape pipe insulation (purchased at Home Depot) is layed around the perimeter of three sides and in spots across the middle and what will be the bottom edge of the panel. The space between the spots will allow ventilation.



The finished panel has plexiglas screwed down into the foam tape every six inches. I used one inch metal roofing screws that have a rubber washer on them. There is also a layer of vinyl electrical tape (3M 88T) around three sides of the perimeter. This is experimental. I'm hoping the tape will protect the foam from UV radiation and make it last a little longer. It is important to predrill the screw holes in the plexiglas and plywood, and to do so on a solid surface. If you try to do it after the foam tape is in place, you will crack the plexiglas for sure.



You will also need a Solar Inverter, Inverters change Direct Current (DC) to Alternating Current (AC). Stand-Alone inverters can be used to convert DC from a battery to AC to run electronic equipment, motors, appliances, etc. Synchronous Inverters can be used to convert the DC output of a PV photovoltaic module,Solar panel, a wind generator or a cell to AC power to be connected to the utility grid. Multifunction inverters perform both functions.Also Solar Batteries are needed to collect or save the free energy from the sun,find the best batteries that will suit all your needs.The solar panel cells are made of photovoltaic (PV) cells you can buy these materials online (internet) or at a store near you,I bought my materials 20 miles from where I live in P.R. Please read carefully the Solar ebook that tells you step by step how to make the Solar Panel cells for your use.The upper information is to make a FULL SIZE working Solar Panel cells to light your home or business etc.

Solar batteries store power generated from the sun and discharge the power as needed (through an inverter).

Good Solar Battery link; http://www.apexbattery.com/solar-batteries.html

Solar Inverter

Solar Battery

BONUS

This lower project is a smaller version to try at your home with your kids,have fun. J

Also you can make...

Make a solar cell in your kitchen

A solar cell is a device for converting energy from the sun into electricity. The high-efficiency solar cells you can buy at Radio Shack

and other stores are made from highly processed silicon, and require huge factories, high temperatures, vacuum equipment, and lots of money.

If we are willing to sacrifice efficiency for the ability to make our own solar cells in the kitchen out of materials from the neighborhood hardware store, we can demonstrate a working solar cell in about an hour.

Our solar cell is made from cuprous oxide instead of silicon. Cuprous oxide is one of the first materials known to display the photoelectric effect, in which light causes electricity to flow in a material.

Thinking about how to explain the photoelectric effect is what led Albert Einstein to the Nobel prize for physics, and to the theory of relativity.

***Materials you will need**

The solar cell is made from these materials:

1. A sheet of copper flashing from the hardware store. This normally costs about $5.00 per square foot. We will need about half a square foot.
2. Two alligator clip leads.
3. A sensitive micro-ammeter that can read currents between 10 and 50 microamperes. Radio Shack sells small LCD multimeters that will do, but I used a small surplus meter with a needle.
4. An electric stove. My kitchen stove is gas, so I bought a small one-burner electric hotplate for about $25. The little 700 watt burners probably won't work -- mine is 1100 watts, so the burner gets red hot.
5. A large clear plastic bottle off of which you can cut the top. I used a 2 liter spring water bottle. A large mouth glass jar will also work.
6. Table salt. We will want a couple tablespoons of salt.
7. Tap water.
8. Sand paper or a wire brush on an electric drill.
9. Sheet metal shears for cutting the copper sheet.

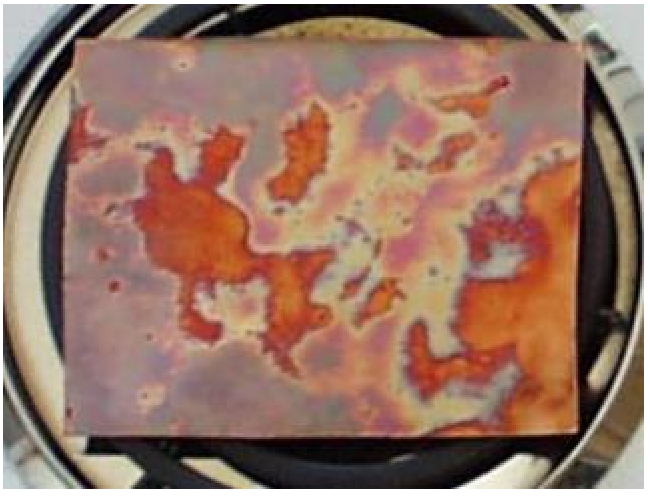
How to build the solar cell

My burner looks like this:

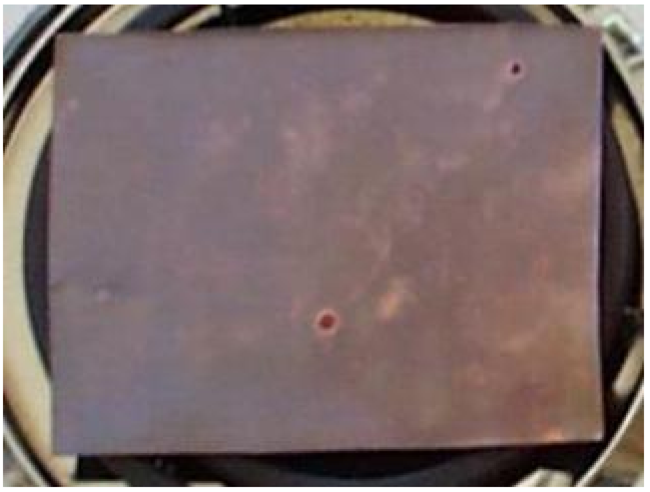
The first step is to cut a piece of the copper sheeting that is about the size of the burner on the stove. Wash your hands so they don't have any grease or oil on them. Then wash the copper sheet with soap or cleanser to get any oil or grease off of it. Use the sandpaper or wire brush to thoroughly clean the copper sheeting, so that any sulphide or other light corrosion is removed.

Next, place the cleaned and dried copper sheet on the burner and turn the burner to its highest setting.

As the copper starts to heat up, you will see beautiful oxidation patterns begin to form. Oranges, purples, and reds will cover the copper.

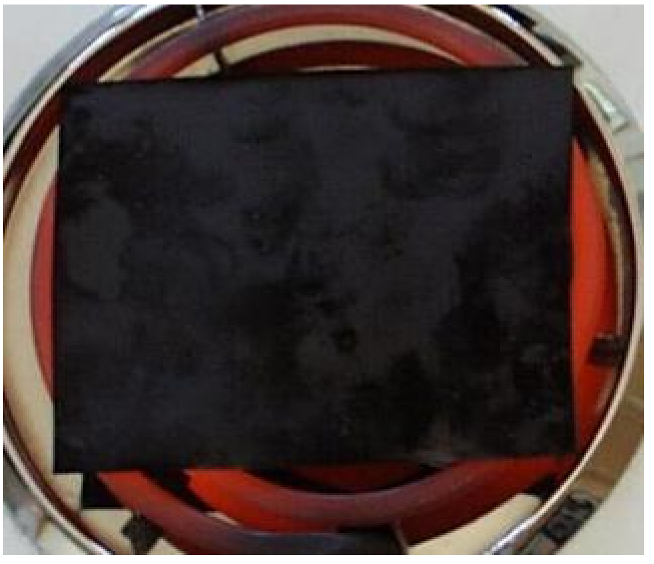


As the copper gets hotter, the colors are replaced with a black coating of cupric oxide. This is not the oxide we want, but it will flake off later, showing the reds, oranges, pinks, and purples of the cuprous oxide layer underneath.



The last bits of color disappear as the burner starts to glow red.

When the burner is glowing red-hot, the sheet of copper will be coated with a black cupric oxide coat. Let it cook for a half an hour, so the black coating will be thick. This is important, since a thick coating will flake off nicely, while a thin coat will stay stuck to the copper.



After the half hour of cooking, turn off the burner. Leave the hot copper on the burner to cool slowly. If you cool it too quickly, the black oxide will stay stuck to the copper.

As the copper cools, it shrinks. The black cupric oxide also shrinks. But they shrink at different rates, which makes the black cupric oxide flake off.

The little black flakes pop off the copper with enough force to make them fly a few inches. This means a little more cleaning effort around the stove, but it is fun to watch.

When the copper has cooled to room temperature (this takes about 20 minutes), most of the black oxide will be gone. A light scrubbing with your hands under running water will remove most of the small bits. Resist the temptation to remove all of the black spots by hard scrubbing or by flexing the soft copper. This might damage the delicate red cuprous oxide layer we need to make to solar cell work.

The rest of the assembly is very simple and quick.

Cut another sheet of copper about the same size as the first one. Bend both pieces gently, so they will fit into the plastic bottle or jar without touching one another. The cuprous oxide coating that was facing up

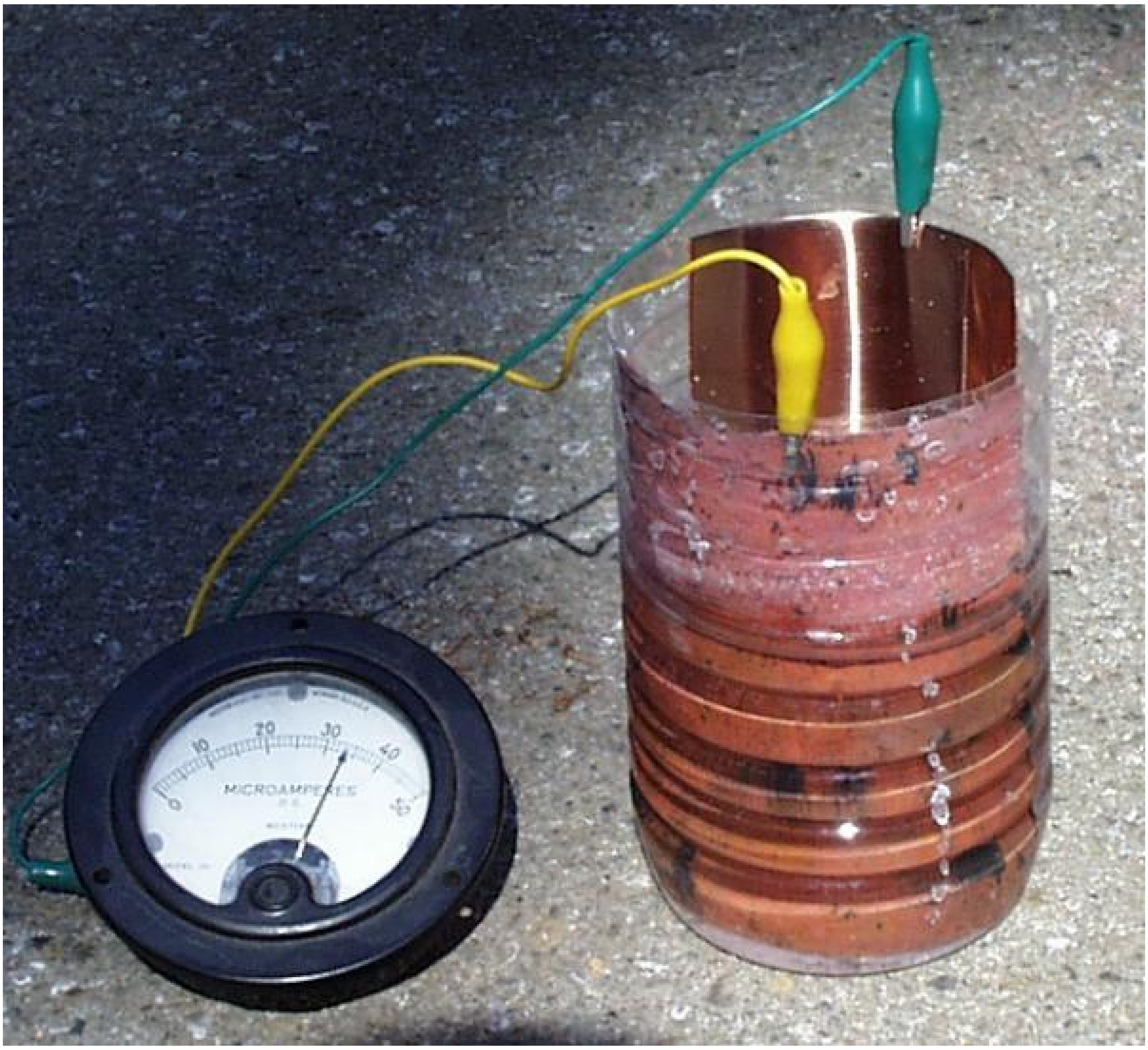
on the burner is usually the best side to face outwards in the jar, because it has the smoothest, cleanest surface.

Attach the two alligator clip leads, one to the new copper plate, and one to the cuprous oxide coated plate. Connect the lead from the clean copper plate to the positive terminal of the meter. Connect the lead from the cuprous oxide plate to the negative terminal of the meter.

Now mix a couple tablespoons of salt into some hot tap water. Stir the saltwater until all the salt is dissolved. Then carefully pour the saltwater into the jar, being careful not to get the clip leads wet. The saltwater should not completely cover the plates -- you should leave about an inch of plate above the water, so you can move the solar cell around without getting the clip leads wet.

The photo above shows the solar cell in my shadow as I took the picture. Notice that the meter is reading about 6 microamps of current.

The solar cell is a battery, even in the dark, and will usually show a few microamps of current.



The above photo shows the solar cell in the sunshine. Notice that the meter has jumped up to about 33 microamps of current. Sometimes it will go over 50 microamps, swinging the needle all the way over to the right.

How does it do that?

Cuprous oxide is a type of material called a semiconductor. A semiconductor is in between a conductor, where electricity can flow freely, and an insulator, where electrons are bound tightly to their atoms and do not flow freely.

In a semiconductor, there is a gap, called a bandgap between the electrons that are bound tightly to the atom, and the electrons that are farther from the atom, which can move freely and conduct electricity.

Electrons cannot stay inside the bandgap. An electron cannot gain just a little bit of energy and move away from the atom's nucleus into the bandgap. An electron must gain enough energy to move farther away from the nucleus, outside of the bandgap.

Similarly, an electron outside the bandgap cannot lose a little bit of energy and fall just a little bit closer to the nucleus. It must lose enough energy to fall past the bandgap into the area where electrons are allowed.

When sunlight hits the electrons in the cuprous oxide, some of the electrons gain enough energy from the sunlight to jump past the bandgap and become free to conduct electricity.

The free electrons move into the saltwater, then into the clean copper plate, into the wire, through the meter, and back to the cuprous oxide plate.

As the electrons move through the meter, they perform the work needed to move the needle. When a shadow falls on the solar cell, fewer electrons move through the meter, and the needle dips back down.

A note about power

The cell produces 50 microamps at 0.25 volts.
This is 0.0000125 watts (12.5 microwatts).

Don't expect to light, light bulbs or charge batteries with this device. It can be used as a light detector or light meter, but it would take lots of them to power your house as many as 40, 50 or more .

The 0.0000125 watts (12.5 microwatts) is for a 0.01 square meter cell, or 1.25 milliwatts per square meter. To light a 100 watt light bulb, it would take 80 square meters of cuprous oxide for the sunlit side, and 80 square meters of copper for the dark electrode. To run a 1,000 watt stove, you would need 800 square meters of cuprous oxide, and another 800 square meters of plain copper, or 1,600 square meters all together. If this were to form the roof of a home, each home would be 30 meters long and 30 meters wide, assuming all they needed electricity for was one stove.

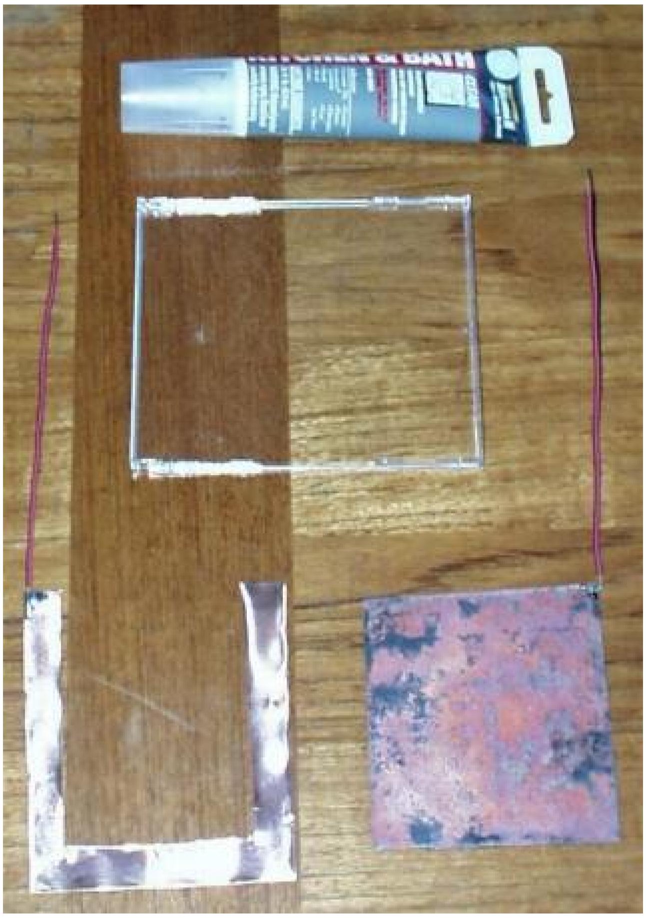
There are 17,222 square feet in 1,600 square meters. If copper sheeting costs $5 per square foot, the copper alone would cost $86,110.00 USD. Making it one tenth the thickness can bring this down to $8,611.00. Since you are buying in bulk, you might get it for half that, or about $4,300.00.

If you used silicon solar panels costing $4 per watt, you could run the same stove for $4,000.00. But the panels would only be about 10 square meters.

Or, for about a dollar, you can build a solar stove out of aluminum foil and cardboard. For about $20, you can build a very nice polished aluminum parabolic solar cooker.

Make A flat panel solar cell

I made a more portable version of the solar cell in a flat panel form. I used the clear plastic top from a plastic CD jewel case as the window, and lots of silicone rubber glue to both attach the pieces together and to insulate them from each other. The bigger the panels the more energy you will make, size is no limit.



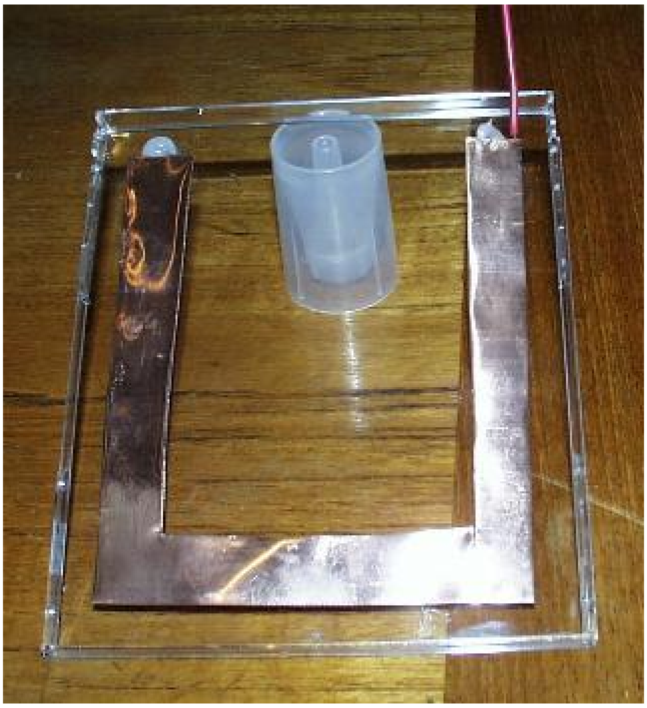
The first step is to make a cuprous oxide plate like we did in the first solar cell. This time I sanded one corner clean all the way down to the shiny copper, and soldered an insulated copper wire to it for the negative lead.

The positive plate is a U shaped piece cut from the copper sheeting, a little bit larger than the cuprous oxide plate, with the cutout portion

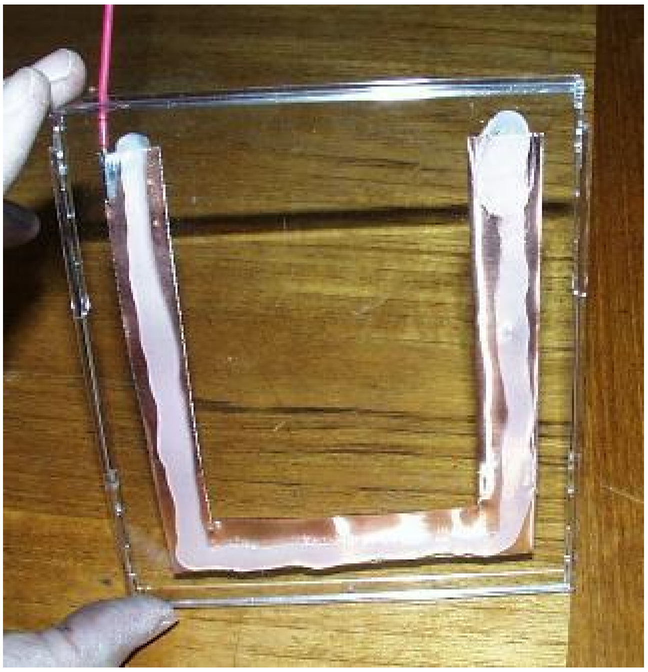
of the U a little bit smaller than the cuprous oxide plate. Another insulated copper wire is soldered to one corner of the U.

The first step in construction is to glue the U shaped copper plate to the plastic window. Use plenty of silicone glue, so the saltwater won't leak out. Make sure that the solder connection is either completely covered with glue, or is outside of the glue U, as shown in the photo (completely covered in glue is best).

The photo below shows the back side of the solar cell (the side not facing the sun) at this point in the construction.



The photo below shows the front side of the solar cell (the side that will face the sun) at this point in the construction. Notice that the silicone glue does not completely cover the copper, since some of the copper must eventually be in contact with the saltwater.

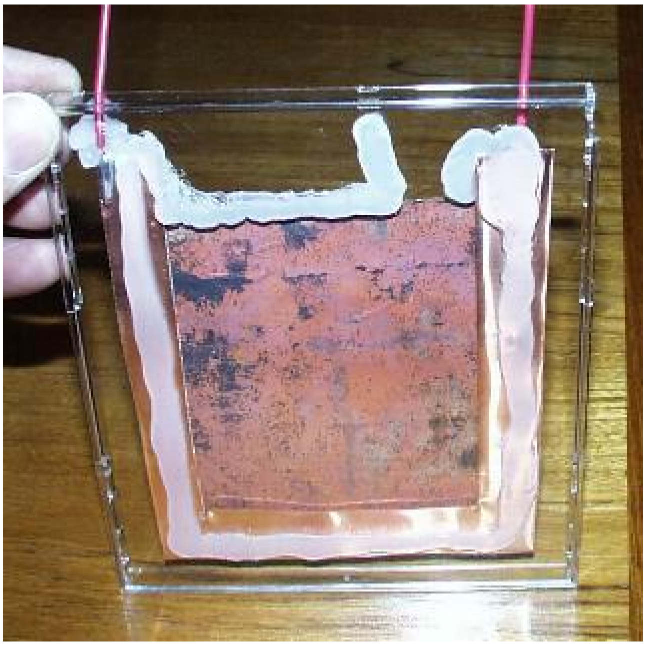


The next step is to lay a good size bead of glue onto the U shaped clean copper plate. This layer will act as an insulator between the clean copper plate and the cuprous oxide plate, and must be thick enough to leave some room for the saltwater. Again, not all of the copper is covered, so there will be plenty of copper in contact with the saltwater.

Gently press the cuprous oxide plate onto this layer of glue. You should press hard enough to make sure the glue seals off any gaps, but not so hard that the two plates touch.

The photo below shows the back side of the solar cell (the side not facing the sun) at this point in the construction.

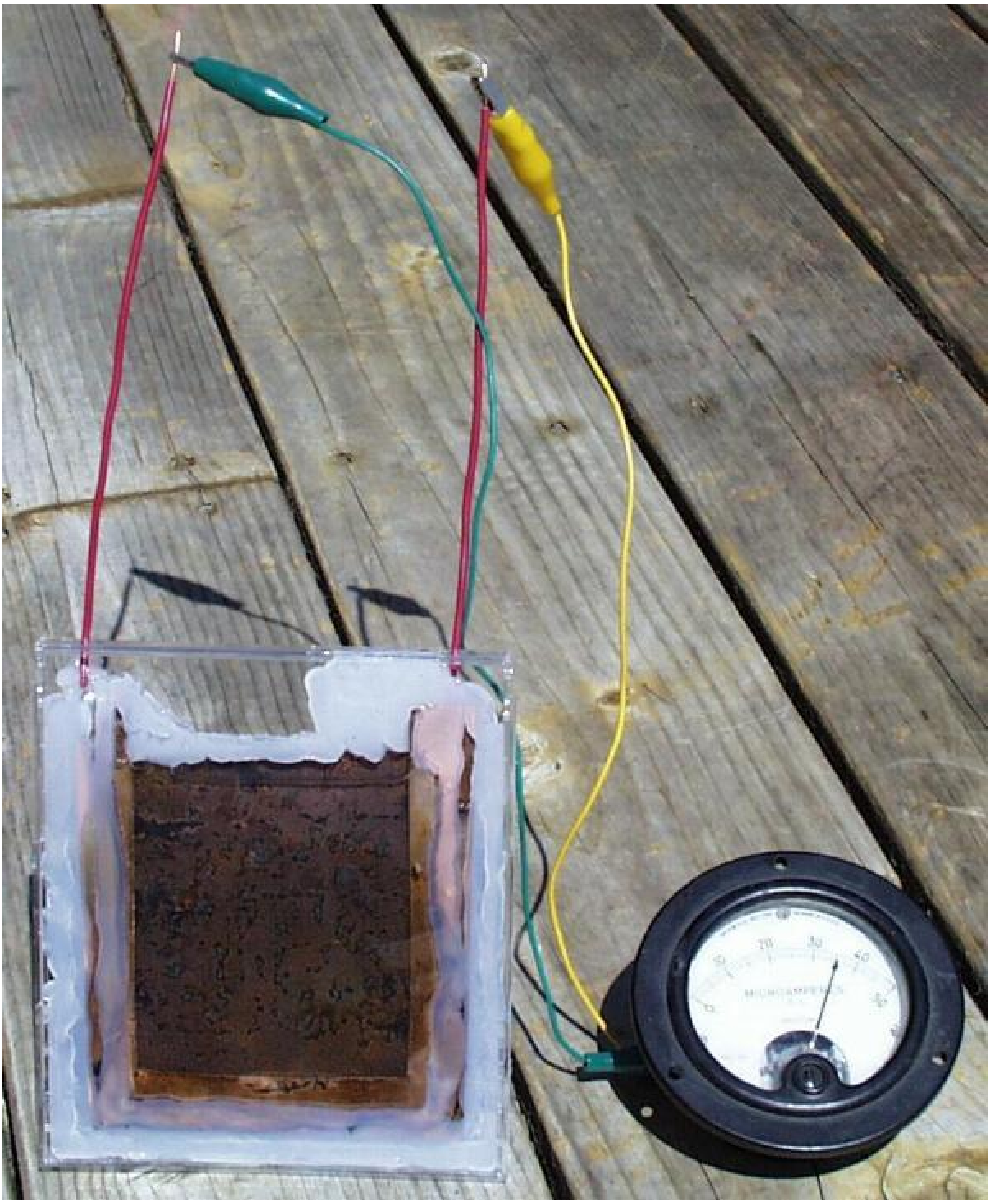
The photo below shows the front side of the solar cell (the side that will face the sun) at this point in the construction. Note that I added extra glue to form a funnel at the top to allow the saltwater to be added.



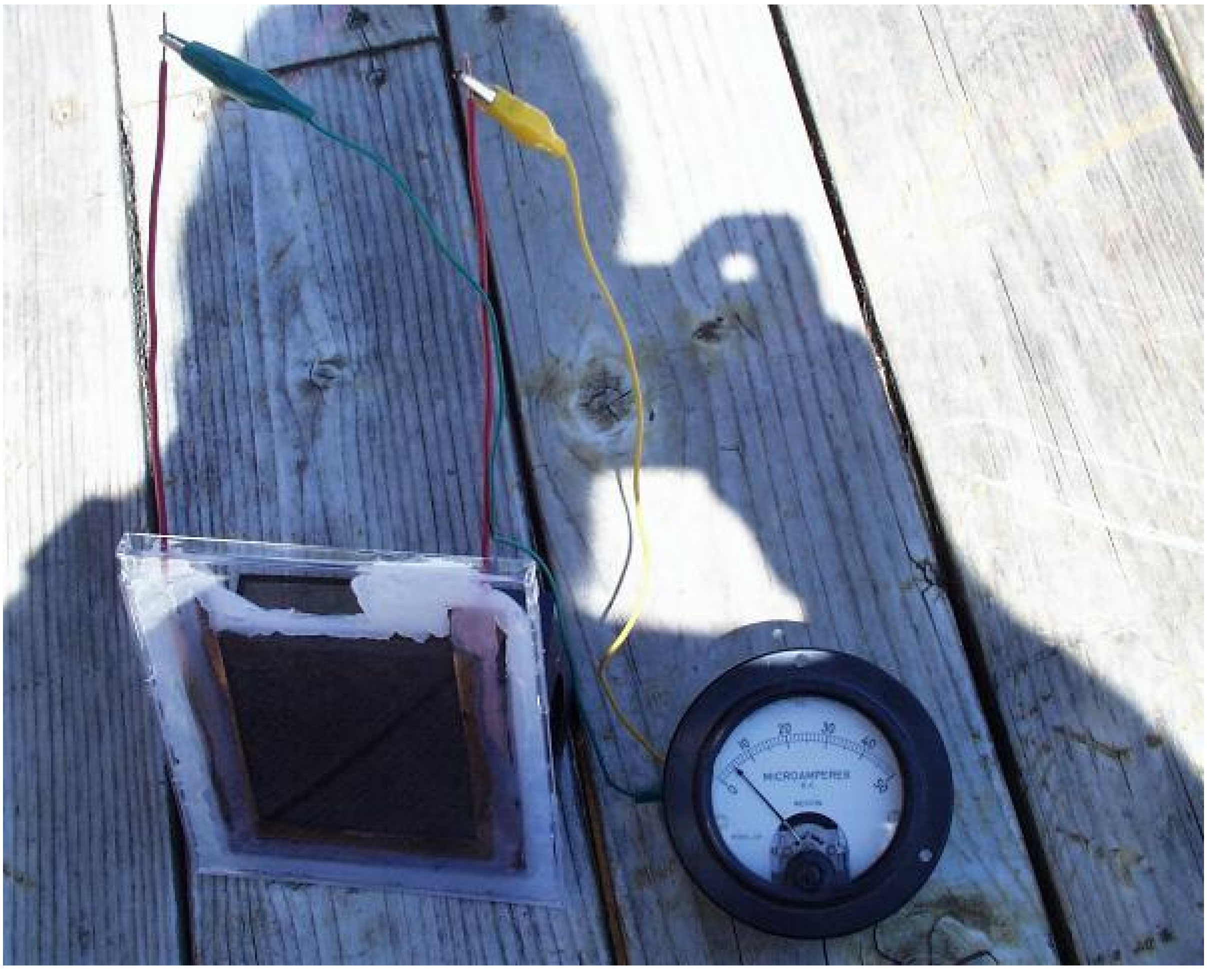
Not shown in the photo is a generous extra bead of glue all around the outside of the plates, to ensure that no saltwater will leak out. Allow the glue to cure before going on to the next step.

Next, use a large eyedropper to add the saltwater. Fill the cell up almost to the top of the copper plate, so it almost spills out. Then seal

the funnel with another generous bead of glue, and allow the glue to cure at least a half hour.



In the photo above you can see the flat panel solar cell in action in the bright sun. It is delivering about 36 microamperes of current. You can also see the extra bead of glue around the edges of the plates, and filling the top of the funnel.



Finally, another shot of the author's shadow. Note that the meter now reads about 4 microamperes, since no sunlight is falling on it.This is the same way you will build the bigger panels for your home ,remember these are home made to save you money and time, many people are using these methods and are using FREE ENERGY from the sun for there homes today, included there is also a FREE BONUS that will show you how to Build a Solar Water Heater and MUCH MORE, please leave me your positive feedback and after I will leave you the same feedback enjoy!!

--------FREE BONUS--------

You will need (ADOBE READER) installed in your PC, this is FREE here at www.adobe.com to be able to read this ebook on your PC.

BUILD A SOLAR WATER HEATER AND MUCH MORE

Copy the link below and paste it into the address or search web bar in your browser.

http://www.consumer.gov.uk/renewables/schools/pdfs/11_16/science_activity_sheets.pdf