What is a solar cell? An independent, environmentally friendly device that converts light into electricity. It's independent, because it can operate on its own, and it doesn't require an external power supply. So there are two types of solar cells. Here, we have a PV cell, so that's photovoltaic. And these have applications in solar panels, solar structures.

I've heard of solar paint, solar planes, and solar window panels. For example, the Crescent Dunes Plant near Tonopah has a 110-megawatt generating capacity and uses molten salts to store extra heat, which can then be drawn and used at night. It's Nevada's largest solar generating station.

And the PV cell is the one that's more common. And as I mentioned before, the photovoltaic cell-- the solar cell that converts light into electricity by the photoelectric effect. The photoelectric effect is the creation of voltage or electric current in the material upon exposure to light.

So here we have the PV cell when it's exposed to light. And then when it's not exposed to light, it doesn't conduct. And then here we have a PV cell set up. It's photo electrochemical. Our lab focuses on photo electrochemical solar cells. Here are the components of a PVC cell. These produce either electrical energy or hydrogen. It's created by the electrolysis of water, so that's the splitting of water. They're applications in fuel cells or like I said hydrogen generation.

So the first part is the working electrode. Here, we have an ITO glass slide. ITO is Indium Tin Oxide, and only one of the sides is conductive. And here we have the same ITO glass side, but it's coated with a solar material. This one is TIO2. That's titanium dioxide. It's a harmless material. It's found on doughnuts and sunscreen. Due to its non-toxicity, it's often used in experiments. I've coated the solar material onto the conductive side of this ITO glass outside.

Solar materials are photoactive, which means they absorb light, and they're capable of converting light into electricity. The ITO glass side is only conductive on one side, so we can check which side is conductive with the multimeter here. Here, we have a measurement of zero, since it's not conductive. So we flip it over. And there we go.

Here, we have the counter electrode. This is a platinum mesh. A conductive material is used as the counter electrode. And most often in labs, these are high-grade metals so that ranges from like platinum to gold. These facilitate the flow of electrons.
Here we have a reference electrode, and the purpose of this electrode is in the name. It's used as a reference. It checks the potential of a cell.

Here, we have the electrolyte solution. This entire setup, with the working electrode, the counter electrode, and the reference electrode is sitting in an electrolyte solution. So there are different electrolytes that can be used depending on the solar material that is being used. We use electrolytes like sodium hydroxide or sodium sulfide.

We have a set up here. Here, we have the working electrode, and we have the reference electrode here and the counter electrode. And everything is sitting in the electrolyte solution. So I would pipette the solution into the cubette that we have. And the entire set up is here.