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Blog

The Birth of Solar Panels

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"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that." Thomas Edison, 1931

Hold on to your hats, folks: The sun has been around for quite some time. And during that time it has done one thing extraordinarily well. It's created and emitted an unbelievable amount of energy. The nitty gritty of that process requires some basic understanding of quantum physics and chemistry, but understand that the sun is a wildly efficient fusion reactor that hangs in the sky and never takes a day off.

Mankind's attempts to harness the free gift of the unlimited energy that pours onto the surface of our planet dates back to the first half of the 19th century, to a man named Edmond Becquerel (http://bit.ly/1CLAAgm). Luckily this French physicist knew a thing or two about the chemistry and quantum physics that go into understanding the photovoltaic effect. Essentially Becquerel understood that when photons hit certain materials, electrons on the surface of that material get excited.

The Photovoltaic Effect

In 1839, at age 19, Becquerel created the first ever photovoltaic cell. This is the forbearer technology for modern day solar panels. What's most interesting about this discovery is that it was born in the basics of developing photographs.

Long before iPhones and digital media, photographs were developed through light exposure and a series of chemical baths. Becquerel, in his youth, took to experimenting with photography. He understood the silver halides used in photo paper reacted to a portion of the light spectrum. For those old enough to conjure up the mental image of a photograph-developing darkroom, you should recall that the space is lit solely by red light. Silver halides react to the blue and ultra violet spectrum of light, so working under red light keeps the photo paper from developing prematurely.

What Becquerel wondered was *why*. Why does this substance react to light, and what else might happen when using this natural chemical reaction in other ways?

Enter the photovoltaic effect.

Becquerel discovered the photochemical effects certain metals have when absorbing the photons we call sunlight. We'll spare you the science lesson and just say that photons excite electrons into motion, and moving electrons are the basis for electricity.

From this base discovery, Becquerel set on a mission to discover what materials react to sunlight and which of them reacts the most. He devised a process that put a light receiver, a material that reacts to sunlight, in an acidic solution along with platinum electrodes that conduct those excited electrons into an electrical current. The voltage was minimal, but this process had never been done before.

The Photoelectric Module

In the mid-1870s, scientific papers dissected (http://bit.ly/1KgNDWP) selenium's conductivity. This earmarked selenium as the prime candidate for further study. Years ticked by, and various engineers and scientists discovered the metal's properties of electric conductivity changed when it's exposed to light. Electrical engineer Willoughby Smith devised a simple test where he was able to explain this strange characteristic of selenium. In complete darkness, selenium appeared to conduct little electrical current, but the metal's conductivity, or electrical flow, appeared to "increase according to the intensity of light."

A battery of tests, including one in which the metal was dipped in water, enabled Smith to declare that the only variable that proved to change conductivity of Selenium is light. Not just direct sunlight either. He proved that diffused, indirect and dim sunlight as well as lamplight create an electrical current in the metal.

In 1883, Charles Fritts, an American inventor decided to coat the light-sensitive metal with a thin layer of gold to conduct the energy that light appeared to generate in selenium. This simple selenium module was capable of what Fritts described (http://bit.ly/1KgNDWP) as a current "that is continuous, constant, and of considerable force."

This invention was so lauded that renowned German inventor and industrialist Werner von Siemens declared that photoelectricity was "scientifically of the most far-reaching importance."

Takeaway

While selenium provided a glimpse at a potential future of solar energy generation, it was still a baby step. The promise of the sun as a source of electricity was now proven as a competitor to the fossil fuel-powered electric plants that started their own rise to prominence around this same time.

Much work is still in order to unlock the true potential of a solar powered planet. We are still in our technological infancy with regards to the backbone of solar-generated power. But it is striking to see how far we've come both in solar energy conversion and in public adoption. It's true that with enough public interest, technological advancements will come faster and faster.

Solar-generated power may well be the primary source for electricity on our planet within this century, but that will only happen if the people of each country stand up and demand it.

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