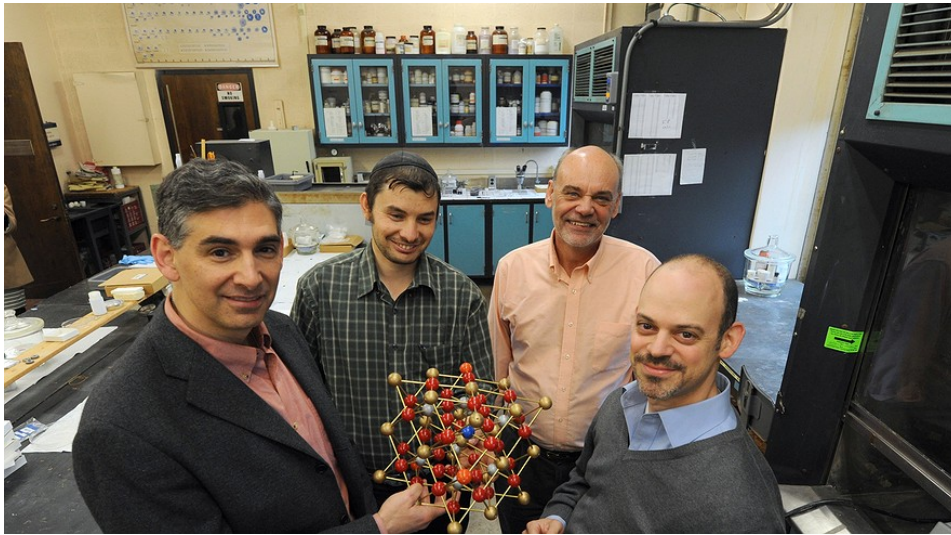


**NEWSLA**  
beta

# Scientists working on a cheaper solar panel

By **Philadelphia Inquirer**, adapted by Newsela staff

**Nov. 27, 2013** midnight



A Penn-Drexel team including (from left) scientists Andrew M. Rappe, Ilya Grinberg, Peter Davies and Jonathan E. Spanier, pictured Nov. 15, 2013, in Philadelphia, has invented a photovoltaic crystal. Photo: April Saul/Philadelphia Inquirer/MCT

**PHILADELPHIA** – Researchers in Pennsylvania may have come up with a new material that could make solar energy less expensive.

Solar panels generate electricity by absorbing sunlight, but that is only half the battle. Once electrons in the panel are energized, they must be channeled in the same direction. To do that, solar panels typically are made with layers of two kinds of materials.

But a team of researchers from the University of Pennsylvania and Drexel University may be on to a better way.

In a new study published online by the journal *Nature*, the scientists reported they had created a new class of ceramic material. The material

could both absorb the energy and channel the electrons cheaply and efficiently.

## The New Ceramic

So far the group has created just tablet-size bits of the new ceramic. But members predict it can be used to make panels that are better at harvesting energy and less expensive than the silicon-based models that dominate the market.

The researchers say their new ceramic also would have an edge over "thin-film" solar panels. Those panels tend to contain materials that are rare, toxic, or both. The new material contains potassium, niobium, barium, and nickel, which are relatively abundant and environmentally friendly.

So is silicon, but it requires lots of processing and manufacturing to be used in solar panels. The authors say their combination of materials will be cheaper in the long run.

"We've opened up a new category of ways of making a solar cell," said Penn chemistry Professor Andrew M. Rappe, who worked on the project.

Solar power accounted for just a quarter of 1 percent of energy consumed in the United States in 2012, according to the U.S. Energy Information Administration. The actual numbers are higher, according to the Solar Energy Industries Association, which says the government does not have complete data on how many rooftop solar panels have been installed.

But by any measure, solar power generation has been climbing steadily. The government has offered money to help drive that increase. And for scientists, the sun remains a tantalizing source of untapped power.

## Barium And Nickel

Materials that can channel the flow of electrons are described as having polarity. They have been known to science for decades. But they have not been used to make solar panels because they primarily absorb energy from ultraviolet light, not from the visible part of the spectrum.

The Penn-Drexel team started with one of these polar materials, called potassium niobate, then used computer models to predict what other elements could be added so that it would absorb visible light.

The eventual winners were barium, which replaces some of the potassium in the structure of the ceramic crystal, and nickel, which replaces some of

the niobium.

"The nickel is really doing the job," Rappe said. "The barium's kind of along for the ride."

The manufacture of the material involved a multistep process of grinding and heating. By adding different amounts of barium and nickel, the scientists found they could tweak the material so that it could absorb varying wavelengths of visible light.

In theory, this type of ceramic could be more than twice as efficient at making energy as the current solar panels, though a lot of work remains to be done, the authors said.

## "It's Pretty Promising"

Lane W. Martin, a professor of materials science and engineering at the University of Illinois, agreed that the approach had potential.

"It's a pretty promising first step in this realm," said Martin, who was not involved with the research.

Future research will involve actually making a solar "cell," complete with electrodes, yet Drexel professor Jonathan Spanier was plenty excited by the small tablets. Spanier conducted tests revealing that the material had the desired properties.

"It's a mixture of excitement and satisfaction and thrill," he said.