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MIT claims 24/7 solar power

[R. Colin Johnson](#)
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PORTLAND, Ore. — Researchers at the Massachusetts Institute of Technology have combined a liquid catalyst with photovoltaic cells to achieve what they claim is a solar energy system that could generate electricity around the clock.

A liquid catalyst was added to water before electrolysis to achieve what the researchers claim is almost 100-percent efficiency. When combined with photovoltaic cells to store energy chemically, the resulting solar energy systems could generate electricity around the clock, the MIT team said.

"The hard part of getting water to split is not the hydrogen -- platinum as a catalyst works fine for the hydrogen. But platinum works very poorly for oxygen, making you use much more energy," said [MIT chemistry professor Daniel Nocera](#). "What we have done is made a catalyst work for the oxygen part without any extra energy. In fact, with our catalyst almost 100 percent of the current used for electrolysis goes into making oxygen and hydrogen."

Nickel oxide catalysts are currently used to boost the efficiency of electrolyzers, and they worked equally well in MIT's formulation, Nocera acknowledged. He added that the toxicity of nickel oxide forces the use of expensive, hermetically-sealed water containers. MIT's patented catalyst formulation is "green," Nocera said, and can be used in inexpensive open containers.

"Nickel oxide can't be used around anything else in the environment because of corrosion -- even the [carbon dioxide](#) in the air will react with it to make carbonates," said Nocera. "But our catalyst uses abundant materials that don't react with environment."

MIT's patented formulation of cobalt phosphate was dissolved in water. When the electrical current is passed through it to initiate electrolysis, the catalyst attached itself to the oxygen electrode to increase its efficiency. When the electrical current was turned off, the cobalt phosphate dissolved back into water.

The simplicity of the process enables basic electrolyzers to be used, the researchers said.

"Because our catalyst is green, the machines that perform electrolysis can be much less expensive than they are today, since they don't need to be protected from environmental contaminants," said Nocera.

Currently, MIT is working with photovoltaic cell manufacturers to incorporate electrolysis using their catalyst into solar energy systems. By combining the two, excess capacity during the day could be stored as hydrogen and oxygen, then used in fuel cells at night when needed.

"Solar cell makers can add super-cheap electrolyzers to their system so that they work 24/7 -- during the day making hydrogen and oxygen, then at night recombining it in fuel cells to generate electricity," [Nocera](#) predicted.

Matthew Kanan, a MIT postdoctoral fellow, assisted in the research. Funding was provided by the [MIT Energy Initiative](#), the Chesonis Family Foundation, the Solar Revolution Project and the National Science Foundation.

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