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## Northwestern team assembling oil alternative

December 21, 2005

BY [SANDRA GUY](#) SUN-TIMES COLUMNIST

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New fuels to wean America from its oil dependence have become the new Holy Grail, and a professor at Northwestern University in Evanston has made an important step in that search.

Samuel I. Stupp is recognized in Scientific American magazine's December issue for his work that could lead to cheap, viable solar energy. The magazine chose 50 researchers to honor for "shaping the future of technology."

Stupp and his research team have shown how a process called self-assembly can be used to make a solar cell. The team designed molecules that self-assemble, joining together on their own, to create a highly ordered structure with a purpose -- in this case, a solar cell.

"The innovation is in knowing that when you make a molecule of a certain structure, it will self-assemble into a functional material," said Stupp, who is both a professor of materials science, chemistry and medicine, and director of the Institute for BioNanotechnology in Medicine at the Feinberg School of Medicine.

Stupp is a pioneer in the field of self-assembly. He was recognized on the cover of Science magazine eight years ago after his team made special molecules that led to materials with specific optical properties.

He has received millions of dollars of support from the U.S. Department of Energy during his years of research.

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His latest achievement involves optics, too.

The molecules in the latest research assemble themselves into a material that can emit a very strong light within a specific range of temperatures. The material, a liquid crystal, emits light of a different wavelength after it has been heated and stimulated with a particular wavelength of light.

"Suddenly, you see this bright light, and depending upon the molecules you use, you can change the color," Stupp said.

The possibility exists that a small voltage of electricity could produce a strong white light. The breakthrough means that within the next decade, the United States might be able to obtain energy from the sun as efficiently as it now pumps it out of oil wells. Manufacturers could produce molecules that self-assemble into solar cells in much the same way the pharmaceutical industry manufactures drugs.

Stupp is a big believer in solar energy as an alternative to oil.

"I think this is really important to the world," said Stupp, who credits his parents with encouraging him to choose his own career in science.

Scientific American also recognized University of Illinois professor John A. Rogers for leading a breakthrough in using organic material in high-tech electronics.

The breakthrough resulted in achieving very high electronic performance out of a type of organic material.

"The current outputs and switching speeds of a transistor made with the organic material were a factor of 10 higher than anything previously observed," said Rogers, a 36-year-old professor of material science and engineering at the University of Illinois at Urbana-Champaign.

The result could lead to plastics, rather than silica, being used to make circuits, and to cheaper radio frequency identification tracking devices.

"We're now scrambling to better understand why [the transistor] came up with that performance, so we can predict what kind of molecule would provide an optimum performance," Rogers said.

Already, the UI-UC team has made prototypes of electronic paper, which will lead to smaller and innovative hand-held devices such as a PDA that looks like a ball-point pen and operates like a Palm Pilot.

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