



Earth's Innovators

Some people think outside the box. Some don't think about boxes at all.

by Dashka Slater

Ted Sargent

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light.utoronto.ca/tsargent

Ted Sargent didn't set out to revolutionize solar technology. The 31-year-old nanotechnologist was working on creating a paintable infrared sensing material that could allow digital cameras to see in the dark or enable ultrafast fiber-optic communications. Then one day in the lab, a graduate student shone an infrared light on the material and watched it convert the energy from that light into electricity.

"That was the eureka moment — seeing that it had this property we hadn't even expected," Sargent recalls. Sargent, who is something of the boy wonder of nanotechnology (the science of building molecule-size devices), is mostly known for creating materials that can be used for fiber-optic communications. But when he realized the implications of his discovery, he started boning up on solar energy. "There's this huge opportunity," he says, "because half the energy that's coming from the sun and hitting the earth is in the infrared spectrum." That energy is untapped by today's solar collectors, which react only to light in the visible spectrum.

Scientists have long been trying to develop so-called plastic solar cells — a light, flexible film that would be cheaper to produce and easier to install than the expensive and cumbersome panels we have today. The problem is that the best plastic solar cells available capture only 6 percent of the sun's radiant energy, none of it in the infrared spectrum. Sargent's invention has the potential to capture up to 30 percent.

The secret is "quantum dots," particles made from semiconductor crystals that are a few nanometers (billionths of a meter) in size. They can be tuned to absorb particular colors of light and then stacked together to capture the broadest possible spectrum. They are so tiny that they can be dispersed in a solvent and then painted onto something else — a house, a car, even a sweater. Sargent imagines clothing that could be used to charge cell phones and laptops, solar building materials that could provide all the electricity needed in the home, and electric cars powered by a solar cell on the roof.

All of this is years away, but Sargent, whose idea of relaxing is to invite 12 people over for dinner and cook something he's never made before, is excited about the challenge. "I never thought of myself as an energy researcher until we fortuitously discovered this," he says. "Now I do."



Carry sunbeams home in a jar: Ted Sargent holds solar cells so tiny that they can be painted onto houses, cars, even clothing.