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MATERIALS SCIENTIST DONALD SADOWAY | MEETING THE MINDS **The Boston Globe**

He's energized to find fuel alternatives

By Carolyn Y. Johnson, Globe Staff | February 20, 2006

CAMBRIDGE -- Years before climate change, greenhouse gases, or oil addictions broke into the popular consciousness, Donald Sadoway had a gut feeling: He did not want to spend his life studying oil.

"I wanted to find a place where I could express my love of chemistry, but I didn't want to be involved with this black goo," the 55-year-old materials science professor recently recalled. So he went into metallurgy instead.

Now, as a growing body of scientific evidence indicates that carbon dioxide and fossil fuels are driving global warming, what started as an instinct has become a full-blown crusade against carbon and oil.

Sadoway, a professor at the Massachusetts Institute of Technology, works to make metal smelters environmentally benign. He invents materials and batteries that will help the world transition from a fossil-fuel-powered world to an "electrochemical" world where energy will be produced and stored cleanly. He tries to incorporate ethics into engineering.

"People are beginning to realize that climate change is the number one problem facing humanity, and I want to be in the cadre of engineers" and scientists who come up with solutions, he said.

Activism isn't new to Sadoway, who grew up in Oshawa, Canada, the grandson of Ukrainian immigrants. In college, he staged demonstrations and practiced civil disobedience to fight for human rights in the former Soviet Union. He led protests and fought for a multicultural Canadian identity -- beyond just British and French. His worldview was shaped by professors who fled the United States because of McCarthyism.

"The stereotype of engineers in the 1960s is these guys with brush cuts, pocket protectors, skinny ties, and slide rules who were very apolitical, and if they had any politics they were conservative. . . . They like order. They like discipline," Sadoway said. His professors showed him that engineers could be social activists, too.

Sadoway is the first to admit that his present day crusades seem mundane at best to the average listener.

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He's seen people glaze over and look for escape routes when he starts to talk about his work. Cleaner metal smelters? The next frontier . . . of batteries?

His latest attempt to help people through science lies on a table in his office: a thin blue square that produces about as much energy as a quadruple-A battery, but has the look and feel of a potato chip bag folded in half. The sLimcell as Sadoway calls the flimsy battery, is basically made of thin foils -- a radical departure from traditional batteries, which are typically heavy and filled with liquids.

One day, powerful but lightweight batteries like the sLimcell prototype will set people free of power outlets and the gas pump, powering everything from laptops to electric cars, Sadoway said.

That, in turn, will allow environmentalism to move forward. Electric cars will no longer be limited by heavy batteries with brief lives, and a "green" choice won't mean a sacrifice.

Current batteries keep people on a short leash, Sadoway said. "We are tethered in the wireless age."

When he is not working in the lab, Sadoway spends much of his time teaching chemistry -- and more -- to half of MIT's freshman class.

He connects basic science concepts to culture, music, and politics. His lesson on the structure of the atom, for instance, comes with a discussion of the role scientists played in the nuclear bomb; when the class discusses DNA, he brings up "the abuses visited upon Rosalind Franklin" by her co-discoverers of DNA, Watson and Crick.

Sadoway hopes to give his students a sense that chemistry affects culture, politics and society, as well as science.

"It's really an elegant way of starting a conversation between policy and hard-core engineering -- not by having a class, 'ethics for engineers,' but [by] getting the student interested from the outset," he said.

FACT SHEET

Hometown: Oshawa, which he describes as the "Detroit" of Canada

Family: Rebecca Rosenberg, a chemistry and modern dance teacher. Children (from a previous marriage) Steven, 27, Laryssa, 24, and Andrew, 21.

An "American" story: The grandson of Ukrainian immigrants, Sadoway didn't speak English until he was 3 years old. His parents ran a motel.

Getting around: He compares driving an electric car to riding a magic carpet -- "when you drive through the city you hear everything." But he loves classic cars and drives an Avanti.

Not your average environmentalist: For every pound of virgin metal manufactured, carbon dioxide is released. If aliens came to Earth and saw a steel mill, they would say, "Oh, cool, this is where they produce the carbon dioxide," said Sadoway. Bank robbers break into banks because that's where the money is. "I work on steel, because that's where the pollution is."

To hear him speak: Tomorrow night, Sadoway will lead a public, salon-style event on fuel cells, batteries, and why hydrogen is not the best way to provide portable power. From 6 to 8 p.m. at the MIT

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Museum, 265 Massachusetts Ave., Cambridge. Admission and parking (after 5, in the Windsor Street lot) is free. Call 617-253-4444 or go to web.mit.edu/museum. ■

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