

Photo courtesy of Stanford R. Ovshinsky.

Stan and Iris Ovshinsky diagramming the hydrogen loop in the 1950s.

## ENERGY

# The Einstein of Alternative Energy?

by Harley Shaiken

I first met Stanford Ovshinsky as the Sixties began to unfold. I was 15, and Stan, as he always liked to be called, was the most remarkable person I had ever met. He was a brilliant scientist and inventor who passionately wanted to change the world. And now, almost five decades later, I would not change my assessment about him except to add that he has succeeded in changing the world in remarkable ways.

One can get a sense of Stan by starting at his home, a warm, beautiful place at the edge of a small lake north of Detroit. Among the many photographs throughout the house that chronicle an amazing life, I'd like to focus on three. The first is a photograph of I. I. Rabi, the great Nobel Prize-winning physicist, with a warm inscription to Stan; the second shows Lázaro Cárdenas, modern Mexico's most beloved president, signing a land reform decree in the 1930s

as three peasants look intently over his shoulder; and the third is of Stan having dinner with Rosa Parks, the hero of the civil rights movement. These photographs underscore three themes that run throughout Stan's life: his scientific brilliance, his social vision and his moral courage.

Stan's scientific work has been path-breaking. The Nobel-winning Rabi referred to his contribution as "stunning and monumental." When Rabi was asked if Stan was another Edison, a singular complement on its own, he is said to have replied "He's an Ovshinsky, and he's brilliant." As a 2008 profile in *The New York Times Magazine* put it, "Ovshinsky is a systems thinker who envisions the future as it should be — and then goes out and invents the scientific tools and technological wizardry needed to bring it to life."

Stan began his career working on automation. From there, he moved on to do original, highly regarded work on

the treatment of schizophrenia with organic drugs. In the mid-1950s, he again changed his focus and began defining the science and technology of amorphous or disordered materials. Stan's discoveries were not exactly embraced with open arms. According to the late Dave Adler, a highly-regarded MIT physicist, "Almost all physicists believed that amorphous semiconductors could not even exist." Stan's work, however, blazed a new trail, and the field that couldn't exist is now named Ovonic. It forms the basis for a "solar hydrogen loop" capable of harnessing and storing the sun's energy and creating a carbon-free energy grid. The result could define our era as the Hydrogen Age.

Energy Conversion Devices, the company Stan and his late wife Iris founded in a store-front in a declining area of Detroit in 1960, drew the best and the brightest from throughout the world. His laboratories became for Hellmut Fritzsche, a close friend and former chair of the physics department at the University of Chicago, "a Mecca for many of us from Stanford, Harvard, MIT, Penn State and Chicago." Stan was able to translate his scientific advances into impressive technologies, such as machines capable of turning out sheets of flexible, thin-film solar material by the mile; nickel metal hydride batteries that power virtually all commercial hybrid vehicles sold today; solid-state hydrogen storage; and innovative memory chips.

What makes these achievements all the more remarkable is that Stan did this pioneering work without formal credentials. Born and raised in Akron, Ohio, he did what one might call "postgraduate work" at the public library at night. The significance of his work has at last begun to receive wide recognition. The American Chemical Society named him and Iris "Heroes of Chemistry 2000" for their

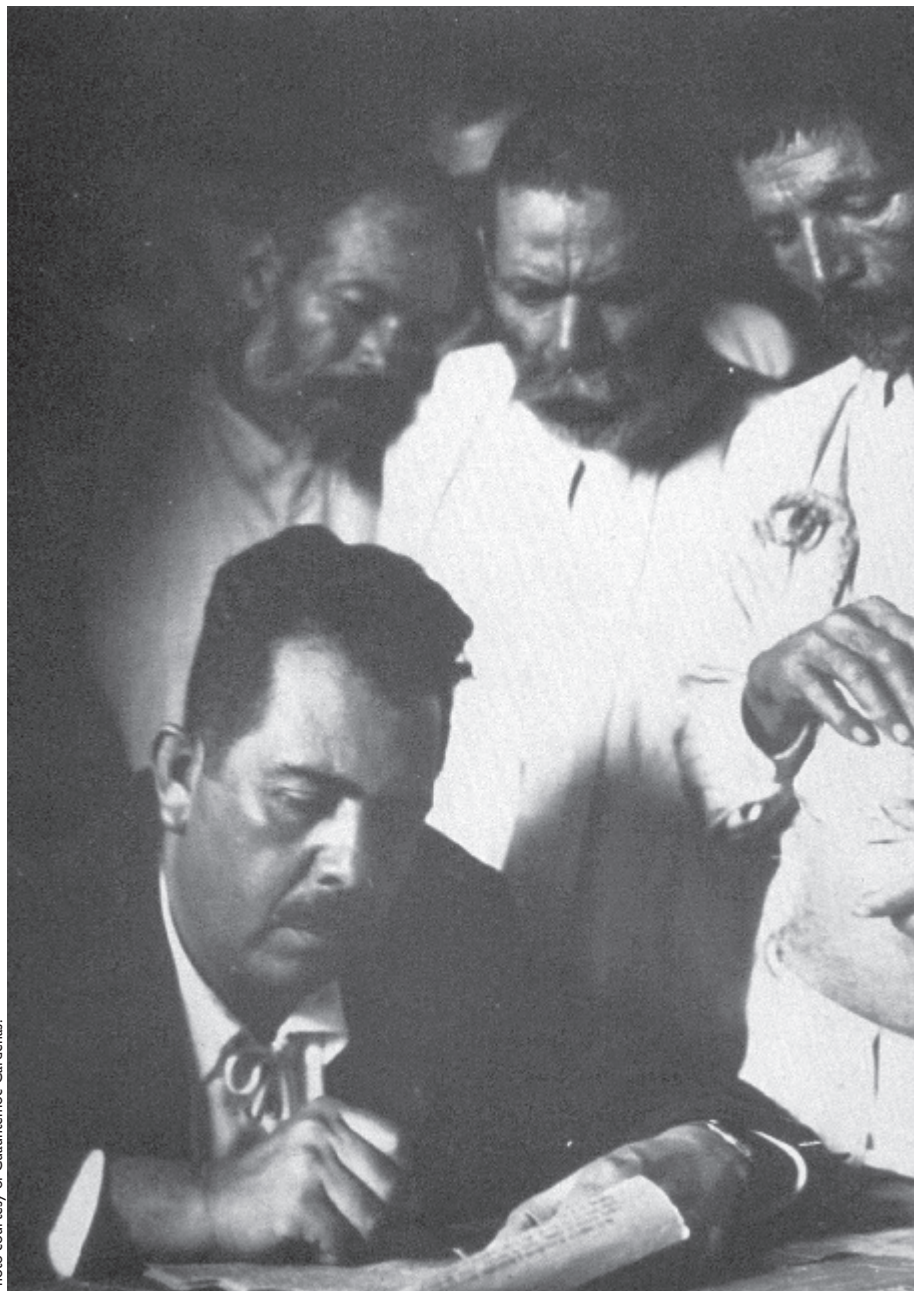


Photo courtesy of Cuauhtémoc Cárdenas.

President Lázaro Cárdenas signs an agrarian reform decree in Los Sauces, Guerrero in 1934.

"significant and lasting contributions to global human welfare." He is a Fellow in the American Physical Society and the American Association for the Advancement of Science and has won innumerable awards for his scientific research and technological accomplishments.

Stan's technical work is informed by his social vision: he wants to create a better world. The widow of President Lázaro Cárdenas gave Stan the photograph of her husband in recognition of what his work

potentially means for Mexico and for Latin America. In fact, Stan often shows a photo of a Mayan woman climbing a hill in the Chiapas rainforest carrying her young child in front and a roll of his solar material on her back. "She is surrounded by the future," he likes to point out. Stan not only sees what electricity could mean to the villagers of Chiapas, he also envisions dynamic new industries capable of fueling Mexico's development.

Stan emphasizes the urgency of developing and implementing the

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Photo courtesy of Energy Conversion Devices, Inc.

The hydrogen-powered Prius.

“solar hydrogen loop” for three reasons: the specter of global warming, the geopolitics of fossil fuels and the possibilities of new industries generating employment. He argues that our continued reliance on fossil fuels has edged us toward the brink of irreversible damage to the planet. The economist William Cline points out that under plausible scenarios, “global emissions of carbon dioxide will approximately double by 2050 and quadruple by 2100.” One particularly damaging consequence is that agricultural potential could plummet 20 to 25 percent in Latin America and Africa by the 2080s, issuing in a new era of global hunger and dislocation.

As serious a concern is the geopolitics of fossil fuels: the growing demand and shrinking access to oil fuels conflict and war, hardly an abstract issue in the world today. The abundance of hydrogen removes a particularly volatile flashpoint between nations. “You’re decoupled from fossil fuels,” Stan says, “and coupled to the origins of the universe.” And, finally, the production and installation of the “hydrogen loop” could create millions of jobs. In Latin America, new industries could propel development, and in the United States, they could propel prosperity. The New York Times featured a front-page article in April 2008 about

two communities in Michigan, one enduring the trauma of a plant closing and the other looking towards the creation of jobs from new solar energy plants built by the company Stan founded.

The theme of moral courage is highlighted by the photograph of Stan having dinner with Rosa Parks in Detroit. Willing to stand alone to develop scientific and technological principles, Stan has been equally courageous in defending the core values of a democratic society. He stood up when unions were organized in the 1930s; when Rosa Parks refused to give up her seat in the front of the bus, jump-starting the civil rights movement in the 1950s; and when democratic principles were under attack in Latin America in the 1960s and 70s. A commitment to civil liberties and human rights informs him as a person, as a citizen and as a scientist. And he does not draw a distinction between these various roles.

His commitment to working towards a better, more democratic world drove his work on alternative energy in the early 1960s. In retrospect, it took an unusual vision to found a company called Energy Conversion Devices years, if not decades, before the threat of oil shortages and climate change began to shape our lives. Stan says he doesn’t mind



being called a visionary, just don't call him a dreamer. After all, he has produced the machines and products that have made his vision into something solid and functional.

Throughout his life, Stan has displayed strong optimism, but he's also realistic. Rather than being crushed by reality, however, he has sought to use his optimism and unique gifts to make a better world. To rephrase the great American labor leader Eugene Debs, "The cross is bending,

the midnight is passing and joy cometh with harnessing the sun."

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Stan Ovshinsky with his thin-film solar technology.



Photo by Marty Nematollahi.