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The Legacy of a Legend

Scott L. Spencer
Publisher

I recently learned that Stan Ovshinsky had succumbed to pancreatic cancer at his home in Michigan. He was 89, and by all accounts led a very full and productive life. If you are not familiar with Mr. Ovshinsky, it would not be surprising. Like Archimedes of Syracuse, as an inventor and visionary Ovshinsky never received the level of public notoriety bestowed on Edison, Einstein or Bell. Yet his research and resulting inventions continue to have a lasting impact on society.

Ovshinsky is best known as the inventor of the nickel-metal hydride battery (NiMH), which was used to power hybrid cars and portable electronics such as laptop computers, digital cameras, mobile phones, and a variety of portable electronic devices. In a partnership with General Motors, he developed the battery that powered the EV1, the first mass-produced electric vehicle of the modern era from a major automaker. This same technology is in use today in other hybrid vehicles such as the Honda Insight and Toyota Prius, although more advanced lithium-ion batteries have replaced NiMH batteries in many applications.

Born in Akron, Ohio, in 1922, Ovshinsky never attended college. He labored in a one-room library devouring technical books and scientific journals that became the foundation of his scientific knowledge. His devotion to learning along with the practical skills he acquired working as a machinist and tool maker led him to become director of research at an automotive and defense supplier at age 30. There he invented an automated lathe used in the production of artillery shells and another for machining brake drums. He worked to develop an electric power steering unit for the automotive industry. In his spare time he studied computers and neurophysiology.

Crossing Scientific Disciplines

As early as the 1950s, Mr. Ovshinsky was proposing hydrogen-based fuel cells as an alternative to the internal combustion engine. Around that time he was crossing scientific disciplines that academics traditionally held separate, including neurophysiology and cybernetics. He invented a mechanical model of a nerve cell—an amorphous thin-film switch called the Ovitron. Remarkably, he was able to recognize that a nerve cell's "learning ability" was derived from the plasticity of the cell's membrane. This insight enabled him to draw on his knowledge of surfaces and materials to fashion very thin layers of amorphous material, thus establishing himself as an early pioneer in the use of nanostructures. He created layers by combining elements, especially from the Group 16 elements under

oxygen, known as chalcogenides, including sulphur, selenium, and tellurium. He would continue to work with chalcogenides throughout his career.

In 1960, with his wife, he founded Energy Conversion Devices with the goal of developing what he called "non-depletable, nonpolluting energy sources." His aim was to reduce the world's dependence on fossil fuels by relying on solar power and hydrogen as energy sources.Ovshinsky astounded the scientific community when he disclosed research that predicted glass could be engineered to conduct electricity. He predicted that glass semiconductors would eventually replace crystalline transistors. He predicted that these "glass transistors" would eventually lead to desktop computers and television sets "hanging like portraits on the wall."

The notion seemed preposterous and scientific journals that published his findings were bombarded with letters from distinguished scientists doubting his claims. It seemed inconceivable at the time that inexpensive, non-crystalline materials like glass could perform as well as more expensive silicon crystals.Gradually, his research became accepted by many of his peers and it spawned a new field of electronics. The discovery had a major impact on physicists who previously believed that only well-ordered crystals had useful electronic properties. "It was like discovering a new continent, like discovering America," said Hellmut Fritzsche, former chairman of the Physics Department at the University of Chicago. "Nobody in the past 50 to 60 years has created such a revolution in science."

Much of Mr. Ovshinsky's work was devoted to developing photovoltaic solar panels. He foresaw a time when shingles could double as rooftop solar panels. He continued his research on amorphous semiconductor technology. He developed a process for applying a microscopically thin layer of amorphous material on sheets of plastic or stainless steel, which later spurred the development of rewritable computer discs and DVDs, and other new computer technologies.Ovshinsky held hundreds of patents in the United States and overseas and was awarded honorary doctoral degrees by at least seven schools, including the University of Michigan. Today his legacy of innovation continues to have an enduring effect on our everyday lives.

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