Darleane Hoffman, Innovator in Nuclear Chemistry, Dies at 98

Hailed as one of the 50 most important women in science, she found ways to study rare radioactive isotopes and advanced the understanding of nuclear fission.

By Delthia Ricks

Published Oct. 5, 2025
Updated Oct. 6, 2025, 2:00 p.m. ET

Darleane C. Hoffman, a trailblazing nuclear chemist who was hailed by Discover magazine as one of the 50 most important women in science and whose research confirmed the existence of several elusive superheavy radioactive elements, died on Sept. 4 at her home in Menlo Park, Calif. She was 98.

Her death was confirmed by her daughter, Dr. Maureane Hoffman.

At the height of her career, Dr. Hoffman was a powerful force in nuclear chemistry. She developed innovative techniques to study rare radioactive isotopes and advanced the understanding of nuclear fission, the process underlying nuclear power — the splitting of heavy atoms and the release of extraordinary amounts of energy.

When she began her studies of nuclear science in the 1940s, she was one of the few

women in the field — even though scientists like Lise Meitner and the two-time Nobel laureate Marie Curie had been instrumental in creating the path forward. “If anything, women were prominent because it wasn’t an established field,” Dr. Hoffman told Discover in 2002, when the magazine honored her, “so it was easier to break into.”

Dr. Hoffman conducted research for 31 years at Los Alamos National Laboratory in New Mexico before joining the chemistry department at the University of California, Berkeley, in 1984. That year, she was appointed a senior faculty scientist and leader of a key research group at Lawrence Berkeley National Laboratory, the federally funded research center operated by the university.

In her new role, she helped settle an ongoing dispute that long ago spilled from polite scientific forums onto an international stage.

In 1974, the chemist Albert Ghiorso of Lawrence Berkeley Lab led a team that produced evidence of a transuranium element known then by its atomic number, 106. A transuranium element refers to any element with an atomic weight above 92 on the periodic table of the elements. Ninety-two is the weight of uranium, a so-called heavy element.

Dr. Ghiorso’s collaborators included Glenn T. Seaborg, who won the 1951 Nobel Prize in Chemistry for his investigation and confirmation of nearly a dozen transuranium elements.

Soviet scientists, however, claimed that they deserved international credit for confirming the existence of element 106 because they had announced their findings in June 1974, three months ahead of Dr. Ghiorso and his collaborators at Lawrence Berkeley Lab.

Working at the Joint Institute for Nuclear Research in Dubna, a city devoted to science within Moscow’s municipal borders, the Soviets said they had bombarded lead-208 and lead-207 targets against chromium-54 ions in a particle accelerator, and declared that they had identified the elusive element. Scientists in the West said the experiment was not reproducible.

Transuranium particles aren’t easy to confirm, and their vanishingly short half-lives of only a couple of minutes in some instances, or mere milliseconds in others, make them excruciatingly difficult to study. These elements are found only through bombardment of heavy atoms with high-energy ions in a particle accelerator to yield a new, heavier product.

Despite the Soviets' announcement, the international scientific community wasn't convinced that the team had proved the existence of element 106.

But in 1993, a joint panel of the International Union of Pure and Applied Chemistry and the International Union of Pure and Applied Physics — basing their decision on research led by Dr. Hoffman — reported that the Berkeley team's findings provided proof of element 106. The research also validated the lab's 1974 claim.

"Anything the Americans did, the Russians always claimed they did it first," said Dr. Maureane Hoffman, a professor of pathology at the Duke University School of Medicine in Durham, N.C. The Russians protested again in 1997, when element 106 received its official name, seaborgium 106, honoring her mother's colleague Dr. Seaborg.

The element has a place on the periodic table of chemical elements and is known by the symbol, Sg106. Dr. Hoffman and colleagues later confirmed the existence of other superheavy elements, including elements 114 and 116.

"One of her proudest achievements was lobbying to have element 106 named after Glenn Seaborg," her daughter said. "Her group was consistent with the earlier American report but not consistent with the Soviet report, so that's how they got to name it."

"Her impact was unparalleled," Dr. Anne M. Baranger, a chemist and interim dean of the College of Chemistry at U.C. Berkeley said in a statement. Credit...via Lawrence Berkeley National Laboratory

Despite a reliance on cyclotrons to find evidence of transuranium elements, Dr. Hoffman discovered in the early 1970s that transuranium elements can occur naturally, a finding that challenged accepted dogma.

Over the decades, Dr. Hoffman's research aided basic nuclear chemical research by pioneering the "one atom at a time" approach to studying superheavy isotopes. This allowed precise investigations of elements that exist only fleetingly after smashing together particles at a speed approaching that of light.

The practical lessons from her research involve the development of radioisotopes for medical use, nuclear waste management and nonproliferation.

"Her impact was unparalleled," Dr. Anne M. Baranger, a chemist and interim dean of the College of Chemistry at U.C. Berkeley, said in a statement. "Professor Hoffman fundamentally added to our understanding of radioactive elements.

“In 1971,” she added, “it was widely believed that transuranium elements did not occur in nature, but in that year, Professor Hoffman discovered small amounts of plutonium-244 in a rock formation. She also isolated and characterized fermium-257 — work that represented a monumental advance in the understanding of the fission process.”

Dr. Hoffman’s career, which ran well into her 80s, her daughter said, was marked by dozens of honors, including a Guggenheim Fellowship in 1978 and the National Medal of Science in 1997.

In 2000, she received the Priestley Medal, the highest honor conferred by the American Chemical Society, and in 2023, she received the prestigious Enrico Fermi Presidential Award, administered by the U.S. Department of Energy’s Office of Science.

Darleane Christian was born on Nov. 8, 1926, in Terril, Iowa, the eldest of Carl and Elverna (Clute) Christian’s two children. Her mother managed the home. Her father taught mathematics and was a school superintendent.

In her 2000 book, “The Transuranium People: The Inside Story,” written with Drs. Ghiorso and Seaborg, Dr. Hoffman reminisced about her father’s mathematical acumen and the influence it had on her and her younger brother, Sherril.

“We were entertained on long drives,” she wrote, “by doing the squares of the numbers up to 20 in our heads and calculating square roots with pencil and paper. I took all the mathematics courses our schools offered. I even took advanced algebra, although that meant I had my father as a teacher.”

She graduated from high school in 1944 and enrolled in Iowa State College (now Iowa State University) in Ames, where she majored in chemistry and was often the only woman in her classes. “This bothered me not at all,” she wrote, “nor did it seem to bother the young men in my classes.”

She received her bachelor’s degree in 1948 and remained at Iowa State for a doctoral degree in physical (nuclear) chemistry in 1951.

Because of a federal security clearance requirement around that time for an Iowa State College job involving atomic energy, she gave herself a fanciful middle name. “I chose the letter X,” she noted, “and told them it stood for Xanthasia, which seemed to satisfy the system.”

In 1951, she married a fellow doctoral student, Marvin Hoffman, a nuclear physicist who assisted her research by operating the college's cyclotron; he died in 2019. In addition to her daughter, Dr. Hoffman is survived by a son, Dr. Daryl Hoffman, a plastic surgeon; three grandchildren; and one great-granddaughter.

Dr. Hoffman began her career in 1952 after accepting a position at Oak Ridge National Laboratory in Tennessee.

"She got her Ph.D. in 1951, and it was uncommon for women to get an advanced degree in the sciences at that time," her daughter said. "But she had a woman chemistry teacher in college who inspired her to think, 'Yeah, that's what I would like to do.' And that was at the root of her wanting to inspire and facilitate the careers of young women in return."