

Laudation for Professor Darleane C. HOFFMAN

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Professor Darleane Christian HOFFMAN was born in Terril, Iowa, U.S.A. She received her B.S. in Chemistry/Math from the Iowa State College, Ames, Iowa, in 1948, and Ph.D. in Physical (Nuclear) Chemistry from the same college in 1951.

Professor HOFFMAN has made numerous seminal contributions to the field of radioanalytical chemistry during her 60 year career as a radiochemist and nuclear chemist. These contributions include determination of the half-lives and other nuclear properties of many of the *f*-element isotopes, the discovery of ^{244}Pu in nature, spontaneous nuclear fission via

symmetric mass division, the electron-capture delayed fission process, the discovery of many of the heaviest isotopes, the confirmation of element 106 enabling the discoverers to propose to name it Seaborgium (Sg), the renaissance of “atom-at-a-time” chemistry, and investigation of the chemical and nuclear properties of the heaviest elements. These discoveries were made possible by Professor HOFFMAN’s ability to develop new radioanalytical capabilities such as the extremely rapid separation procedures and automated target gas-jet transport systems that are now routinely used in the field of heavy element discovery. In addition, she has applied these fundamental studies to problems of global significance, such as the geologic disposal of radioactive waste and the application of radioanalytical chemistry to nuclear forensics.

Some of her most note-worthy contributions include the development of rapid separations used in the field of heavy element discovery. Professor HOFFMAN published a paper in the journal *Radiochimica Acta* in 1993 in which she coined the phrase “atom-at-a-time chemistry”. In this paper, she clearly demonstrated her skill as both an analytical chemist and nuclear chemist through the description of the extraction used to separate radionuclides produced during fusion reactions, and their subsequent detection in the nuclear detectors designed for these studies. This skill was clearly evident in her early career where she reported in 1956 on the use of alpha-hydroxyisobutyrate to separate the lanthanides and actinides by ion exchange. This kind of separation is still used routinely today in the field of nuclear forensics. These radioanalytical skills were also essential for the discovery of ^{244}Pu in nature, and elucidation of the chemistry of the elements beyond the actinides, where it was experimentally shown that due to relativistic effects, the chemical properties of the transactinide elements (often called TANs), cannot be simply extrapolated from properties of their lighter homologues in the periodic table.

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Professor HOFFMAN has published some 270 papers in peer-reviewed journals. These contributions were made in collaboration with colleagues and students at the Los Alamos National Laboratory and later with numerous graduate and undergraduate students and post-doctoral associates who worked with her at the University of California, Berkeley where she has been a faculty member since 1984, and has mentored 19 Ph.D. students. Together with Albert GHIORSO and Glenn T. SEABORG, she authored a book, “The Transuranium People: *the Inside Story*”, published in 2000. Professor HOFFMAN’s graduate students and former postdoctoral associates are now staff scientists and faculty members at national laboratories and universities across the U.S. and around the world. She is now Professor Emerita, but continues to serve on numerous academic and national committees.

In addition to her academic career, Professor HOFFMAN has had a very productive national laboratory career. She served as a staff chemist at Oak Ridge National laboratory immediately after earning her Ph.D. degree. In 1953, she joined Los Alamos National Laboratory, where she was promoted through the scientific ranks and became Associate Group Leader of Nuclear and Radiochemistry. During 1964–1965, she was a National Science Foundation Senior Postdoctoral Fellow for research on short-lived isotope separations at the Research Reactor in Kjeller, Norway. She was selected as a Guggenheim Fellow at Lawrence Berkeley National Laboratory from 1978 to 1979, and then returned to Los Alamos Laboratory as the Division Leader of the Chemistry-Nuclear Chemistry Division in 1979. She also served as the Division Leader of the Isotope and Nuclear Chemistry Division from 1982 to 1984. In 1984, she returned to Berkeley to a joint academic-national laboratory position, where she was a tenured Professor at UC-Berkeley and Leader of the Heavy Element Nuclear and Radiochemistry Group at Lawrence Berkeley National Laboratory. She also held an appointment at Lawrence Livermore National

Laboratory where she was the co-founder of the Seaborg Institute for Transactinium Science, and she served as its first Director from 1991 to 1996.

Professor HOFFMAN has received numerous awards for her scientific research, which include the U.S. National Medal of Science in 1997 (bestowed by the President of the U.S.), the American Chemical Society’s Priestley Medal in 2000, and the Garvan-Olin Medal in 1990. She also received the ACS Award in Nuclear Chemistry in 1983. She received the Sigma Xi Proctor Prize for Scientific Achievement in 2003, the U.S. Radiochemistry Society’s Lifetime Award for Devotion to Radiochemistry Science & Education in 2004, and the Atanasoff Search and Discovery Award 2007 from Iowa State University.

During her career, Professor HOFFMAN has been amazingly active in service to the community of radioanalytical chemists. Examples of her tireless service include her (2007–2009) membership on the selection committee for U.S. National Medal of Science and the National Academy’s Committee on Nuclear Forensics, which advises the U.S. Congress on sustaining the domestic forensics capabilities. She is also a member of a subcommittee of the U.S. Department of Energy’s Nuclear Energy Advisory Committee; this subcommittee is focused on Advanced Nuclear Transformation Technologies. In addition, she is currently serving on the U.S. Air Force Technical Applications Center’s Expert Panel. In the past, she has been an appointed member of the National Academy’s Board on Radioactive Waste Management, chair of the Committee on Nuclear and Radiochemistry for the National Academy’s Board on Chemical Sciences and Technology, and most recently (2008–10) the Committee to assess the U.S. Nuclear Forensics Capabilities. She has hosted and organized numerous national and international conferences and symposia.

It is indeed a pleasure to honor Professor Darleane C. HOFFMAN with the Hevesy Medal Award 2010.