

CHEMICAL HERITAGE FOUNDATION

RICHARD E. HONIG

Transcript of an Interview
Conducted by

Michael A. Grayson

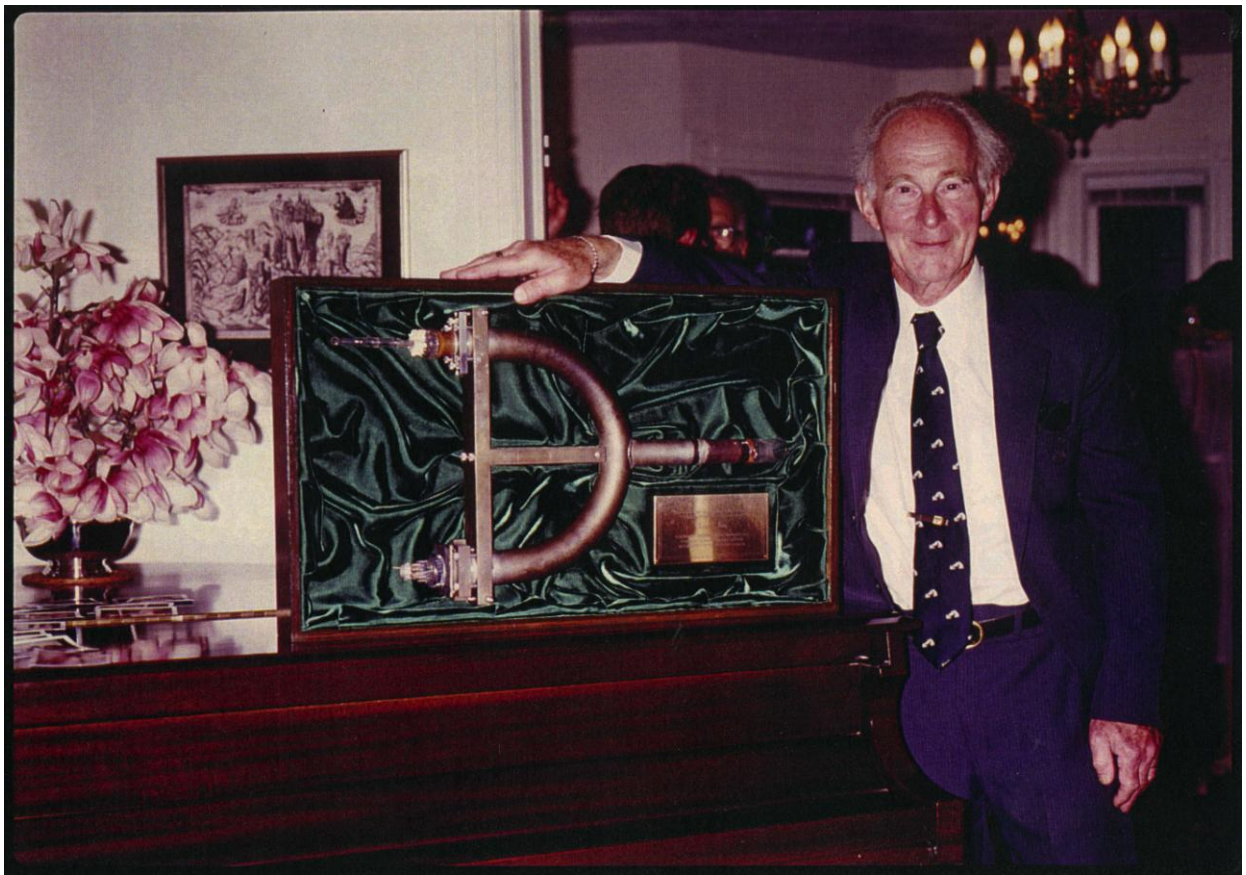
at

The Quadrangle
Haverford, Pennsylvania

on

27 April 1996

(With Subsequent Corrections and Additions)



The spectrometer tube from the Secondary Ion Mass Spectrometer constructed at RCA Laboratories, Princeton NJ, in 1954 by Richard E. Honig. Photograph taken at his retirement party, April 1987.

ACKNOWLEDGMENT

This oral history is one in a series initiated by the Chemical Heritage Foundation on behalf of the American Society for Mass Spectrometry. The series documents the personal perspectives of individuals related to the advancement of mass spectrometric instrumentation, and records the human dimensions of the growth of mass spectrometry in academic, industrial, and governmental laboratories during the twentieth century.

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RICHARD E. HONIG

1917 Born in Göttingen, Germany

Education

1938 B.S.E.E., Robert College, Istanbul, Turkey
1939 M.S., Physics, Massachusetts Institute of Technology
1944 Ph.D., Physics, Massachusetts Institute of Technology

Professional Experience

Massachusetts Institute of Technology, Cambridge, Massachusetts
1939-1940 Lecturer, Physics
1941-1946 Researcher, Radiation Laboratory

Bluffton College, Bluffton, Ohio
1940-1941 Lecturer, Mathematics & Physics

Socony-Vacuum Research Laboratories, Paulsboro, New Jersey
1946-1950 Researcher, Mass Spectrometry

RCA Laboratories, Princeton, New Jersey
1950-1966 Researcher
1966-1982 Head, Materials Characterization Group
1982-1987 Staff Scientist

Brussels University, Brussels, Belgium
1955-1956 Visiting Researcher

Honors

1964-1968 Chairman of Subcommittee VII on Solids Studies of ASTM E-14
Committee on Mass Spectrometry
1968-1970 Vice President, American Society for Mass Spectrometry
1970-1972 President, American Society for Mass Spectrometry
1972-1974 Past President, American Society for Mass Spectrometry
Fellow, American Physical Society
Adjunct Research Professor, Rensselaer Polytechnic Institute (while
still at RCA Laboratories)
1986 Awarded The Science Medal from the Vrije Universiteit of Brussels

Member, Böhmisches Physikalische Gesellschaft

ABSTRACT

Richard E. Honig was born in Göttingen, Germany, the eldest of three boys. His father, a professor of law at the University of Göttingen, was among the first group of professors dismissed from the university by the Nazi regime in 1933. The family subsequently relocated to Istanbul, Turkey, where Honig's father had been asked to help westernize the Turkish educational system. Honig spent his last two years of high school at a German school in Istanbul, where he augmented the classical education he received in Germany with a math and science curriculum. He went on to attend Robert College, an American college in Istanbul, from which he was graduated with a bachelor of science degree in electrical engineering.

In 1938, Honig moved to the United States to pursue a Ph.D. in Physics at the Massachusetts Institute of Technology (MIT). Through a course in nuclear physics, he became interested in the nature of atoms, molecules and particularly isotopes, and eventually built his own mass spectrometer to study the effects of deuterium and cyclotron radiation on methane. Because there was little activity in mass spectrometry at MIT at the time, Honig immersed himself in the literature and visited several commercial laboratories involved in mass spectrometry, notably John Hipple's lab at Westinghouse Corporation and a commercial lab in New England that owned a Consolidated Engineering Company (CEC) mass spectrometer. His thesis on the nature of gas flow in that mass spectrometer, which was written under the direction of Clark Goodman, an MIT geologist with good knowledge of nuclear physics, grew out of observations he made on the gas inlet system of the CEC instrument. While still a student at MIT, Honig taught for a year at Bluffton College in Ohio and then, following the completion of his Ph.D., taught for several years at MIT. He became a U.S. citizen in the early 1940's.

In 1946, Honig accepted a position at Socony-Vacuum Labs in Paulsboro, New Jersey, where he was able to continue the pursuit of his interest in the study of small hydrocarbon molecules with mass spectrometry. Honig joined the research staff at the Radio Corporation of America Laboratories in Princeton, New Jersey, in 1950, where he remained for the rest of his long career. His work began in Don North's group, studying materials used in hot cathodes. He designed and built a two-stage mass spectrometer, which led a few years later to the development of a secondary ion mass spectrometer (SIMS). He spent a year during the mid-1950's at the University of Brussels helping to start a mass spectrometry laboratory with Jean Drowart. He traveled extensively in Germany and England, observing the post-War recoveries of the two countries while participating in mass spectrometry conferences that were beginning to spring up in the late 1950's and early 1960's.

Honig's career at RCA focused on materials characterization, particularly impurities in semiconductor materials, first with mass spectrometry and then later with a variety of surface analysis techniques when he became head of the newly formed Materials Characterization Research Group there in the mid-1960's. He reported coupling a laser to a mass spectrometer, demonstrating that the chemical nature of metal, semiconductor, and insulator surfaces could be probed by laser desorption followed by mass analysis. He and his group built a number of mass spectrometers, including several within ultrahigh vacuum systems to facilitate surface analysis. His long-time interest in cluster formation led to his measurement of elemental vapor pressures as a function of temperature and the evaluation of previously reported values for these quantities. The so-called vapor pressure curves he generated, initially hand-drawn in the days before computer-aided graphics, were first published in 1957 and updated in 1962 and 1969.

Honig stepped down from his managerial position in 1982 and spent the next several years back in the laboratory helping to design and build a new mass spectrometer to study the organic materials on surfaces. When RCA was purchased by General Electric in the mid-1980's, the nature of research in the laboratories changed, and Honig elected to retire in 1987, just short of his seventieth birthday.

During the interview Honig describes some of his collaborations with colleagues and his papers, of which there are many. He talks about the growth of mass spectrometry technology and its organizations, the American Society for Testing and Materials and the American Society for Mass Spectrometry, of which he was the second president. He suggests that his work in the development of SIMS started in the "Stone Age" of mass spectrometry, where available electronics limited progress, and finished with the flowering of the technology which was made possible in part by the advent of solid-state devices.

INTERVIEWER

Michael A. Grayson retired from the Mass Spectrometry Research Resource at Washington University in St Louis in 2006. He received his B.S. degree in physics from St. Louis University in 1963 and his M.S. in physics from the University of Missouri at Rolla in 1965. He is the author of over forty-five papers in the scientific literature dealing with mass spectrometry. Before joining the Research Resource, he was a staff scientist at McDonnell Douglas Research Laboratory. While completing his undergraduate and graduate education, he worked at Monsanto Company in St. Louis, where he learned the art and science of mass spectrometry under O. P. Tanner. Grayson is a member of the American Society for Mass Spectrometry [ASMS], and currently is the Archivist for that Society. He has served many different positions within ASMS. He has served on the Board of Trustees of CHF and is currently a member of CHF's Heritage Council. He continues to pursue his interest in the history of mass spectrometry by recording oral histories, assisting in the collection of papers, researching the early history of the field, and preparing posters recounting historic developments in the field.

TRANSCRIPT REVIEW

Special thanks to **Bryan L. Bentz** of Waters Corporation who contributed his time to reviewing this transcript for the family of Richard E. Honig.

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