CHEMICAL HERITAGE FOUNDATION

R. STANLEY WILLIAMS

Transcript of an Interview
Conducted by

Cyrus Mody

at

Palo Alto, California

on

14 March 2006

(With Subsequent Corrections and Additions)

ACKNOWLEDGEMENT

This oral history is part of a series supported by the Center for Nanotechnology in Society (CNS), University of California, Santa Barbara, under the National Science Foundation Grant No. SES 0531184. Scholars and other people using this interview should acknowledge in all written publications. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the interviewee and interviewer and do not necessarily reflect the views of the National Science Foundation.

This oral history series is an important resource for the history of nanotechnology, documenting the lives and careers of key scientists and engineers that shaped and contributed to the contemporary practice of science and technology.

CHEMICAL HERITAGE FOUNDATION
Oral History Program
FINAL RELEASE FORM

This document contains my understanding and agreement with Chemical Heritage Foundation with respect to my participation in the audio-recorded interview conducted by Cyrus Mody on 14 March 2006.
I have read the transcript supplied by Chemical Heritage Foundation.

1. The audio recording, corrected transcript, photographs, and memorabilia (collectively called the "Work") will be maintained by Chemical Heritage Foundation and made available in accordance with general policies for research and other scholarly purposes.

2. I hereby grant, assign, and transfer to Chemical Heritage Foundation all right, title, and interest in the Work, including the literary rights and the copyright, except that I shall retain the right to copy, use, and publish the Work in part or in full until my death.

3. The manuscript may be read and the audio recording(s) heard by scholars approved by Chemical Heritage Foundation subject to the restrictions listed below. The scholar pledges not to quote from, cite, or reproduce by any means this material except with the written permission of Chemical Heritage Foundation.

4. I wish to place the conditions that I have checked below upon the use of this interview. I understand that Chemical Heritage Foundation will enforce my wishes until the time of my death, when any restrictions will be removed.

Please check one:

a. _____ **No restrictions for access.**
NOTE: Users citing this interview for purposes of publication are obliged under the terms of the Chemical Heritage Foundation Oral History Program to obtain permission from Chemical Heritage Foundation, Philadelphia, Pennsylvania.

b. ✓ **Semi-restricted access.** (May view the Work. My permission required to quote, cite, or reproduce.)

c. _____ **Restricted access.** (My permission required to view the Work, quote, cite, or reproduce.)

This constitutes my entire and complete understanding.

(Signature) R. Stanley Williams
R. Stanley Williams

(Date) February 19, 2007

This interview has been designated as **Semi Restricted Access**.

One may view the oral history with the permission of CHF.
However, the permission of the interviewee is required to quote from, cite, or reproduce the oral history.

Please contact CHF to request permission.

Chemical Heritage Foundation
Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106

R. STANLEY WILLIAMS

1951	Born in Kodiak, Alaska on 27 October

Education

1974	B.A., chemical physics, Rice University
1976	M.S., physical chemistry, University of California, Berkeley
1978	Ph.D., physical chemistry, University of California, Berkeley

Professional Experience

AT&T Bell Labs

1978-1980	Technical Staff

University of California, Los Angeles

1980-1984	Assistant Professor, Chemistry
1984-1986	Associate Professor, Chemistry
1986-1995	Professor, Chemistry

Hewlett-Packard Laboratories

1995-present	Quantum Science Research group, Founding Director Senior HP Fellow

Honors

Dreyfus Teacher-Scholar Award
Sloan Foundation Fellowship

2000	Julius Springer Award for Applied Physics
2000	Feynman Prize in Nanotechnology
2002	Scientific American 50 Top Technology Leaders
2003	Herman Bloch Medal for Industrial Research
2004	Joel Birnbaum Prize
2005	Scientific American 50 Top Technology Leaders
2007	Glenn T. Seaborg Medal

ABSTRACT

R. Stanley Williams begins the interview by discussing his childhood and Sputnik's influence on his decision to study science. Then Williams described his early predisposition towards chemistry and learning from both his father and books from the library. After a positive experience in high school, Williams found himself not as prepared in comparison to his peers at Rice University. Williams worked hard to catch up, and was mentored in microwave spectroscopy by Professor Robert Curl. After obtaining his undergraduate degree, Williams worked at Hewlett-Packard for a summer through Robert Curl's connections. At HP Williams worked on photoelectron spectrometers and made some notable contributions. Next Williams worked on photoemission while pursing his graduate degree at the University of California at Berkeley. After receiving his Ph.D., Williams accepted a position at Bell Laboratories as staff scientist—his research there involved using photoemission to study surface chemistry. Disliking the corporate culture at Bell, Williams moved to University of California at Los Angeles after one year. At UCLA Williams started from scratch and very quickly built up a large research lab. Throughout his stay at UCLA, Williams' research topic ranged from photoemission, ion scattering, STM, and finally AFM. After an earthquake in 1994 destroyed most of his instruments, Williams returned to HP and started a research initiative that eventually evolved into the Quantum Science Research Laboratory [QSR]. QSR's four research areas include: nano electronics; nano photonics; nano mechanics; and nano architecture. Williams concludes the interview by offering his thoughts on outside collaboration and funding, the importance of micro-electro-mechanical systems [MEMS] to HP, and how he views QSR in relations to other research institutions.

INTERVIEWER

Cyrus Mody is an Assistant Professor of History at Rice University. Prior to that position he was the manager of the Nanotechnology and Innovation Studies programs in the Center for Contemporary History and Policy at the Chemical Heritage Foundation. He has a bachelor's degree in mechanical and materials engineering from Harvard University and a Ph.D. in science and technology studies from Cornell. He was the 2004-2005 Gordon Cain Fellow at CHF before becoming a program manager. Mody has published widely on the history and sociology of materials science, instrumentation, and nanotechnology.

TABLE OF CONTENTS

NOTES

1. J. A. Yarmoff, D. M. Cyr, J. H. Huang, S. Kim, R. S. Williams, "Impact-collision ion-scattering spectroscopy of Cu(110) and Cu(110)-(2×1)-O using 5-keV $^{6}Li^{+}$," *Physical Review B* 33 (1986): 3856-3868.

2. R. S. Williams, R. S. Daley, J. H. Huang, R. M. Charatan, "Initial-Stages of Metal-Semiconductor Interface Formation – Au and Ag on Si(111)," *Applied Surface Science* 41-2 (1989): 70-74.

3. a. R. J. Wilson, S. Chiang, "Structure of the Ag/Si(111) Surface by Scanning Tunneling Microscopy," *Physical Review Letters* 58 (1987): 369-372.

   b. E. J. Vanloenen, J. E. Demuth, R. M. Tromp, R. J. Hamers, "Local Electron-States and Surface Geometry of Si(111) – (Square-Root 3 x Square-Root 3) Ag," *Physical Review Letters* 58 (1987): 373-376.

4. M. Katayama, R. S. Williams, M. Kato, E. Nomura, and M. Aono, "Structure analysis of the Si(111) root 3 × root 3 R30°-Ag surface," *Physical Review Letters* 66 (1991): 2762-2765.

5. E. A. Eklund, R. Bruinsma, J. Rudnick, R. S. Williams, "Submicron-Scale Surface Roughening Induced by Ion-Bombardment," *Physical Review Letters* 67 (1991): 1759-1762.

INDEX

T

U

V

W

Z