CHEMICAL HERITAGE FOUNDATION

DONALD L. KLEIN

Transcript of Interviews
Conducted by

David C. Brock

By Phone

on

2 and 9 March 2006

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
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DONALD L. KLEIN

1930 Born in Brooklyn, New York on 19 December

Education

1952 B.S., Chemistry, Polytechnic Institute of Brooklyn
1956 M.S., Inorganic Chemistry, University of Connecticut
1959 Ph.D., Inorganic Chemistry, University of Connecticut

Professional Experience

Sylvania Electric Products, Inc., Woburn, Massachusetts
1952-1954 Chemist, Chemistry and Physics Department

University of Connecticut, Storrs, Connecticut
1954-1958 Research Assistant, Teaching Assistant, and Assistant Instructor, Chemistry Department

Bell Laboratories, Murray Hill, New Jersey
1958-1967 Member of Technical Staff and Supervisor

IBM Corporation, East Fishkill, New York
1968-1987 Senior Engineer, Manager, and Technical Staff
1987-present Consultant

Dutchess Community College, Poughkeepsie, New York
1987-1988 Member of Faculty, Department of Physical Sciences; Lecturer in Chemistry

Honors

1982 IBM Invention Award
1994 Inducted into New Jersey Inventors Hall of Fame
1994 Jack A. Morton Award of the Institute of Electrical and Electronics Engineers
1999 Brooklyn Technical High School Alumni Hall of Fame

ABSTRACT

Donald L. Klein is the son of a Hungarian father and a Hungarian-American mother, who grew up in Brooklyn, New York. With his childhood friend, Neil Wotherspoon, Klein developed an early passion for chemistry, electronics, and amateur radio, interests that would follow him throughout his life and career. At Brooklyn Technical High School, he discovered an additional passion for metallurgy. He completed his undergraduate degree in chemistry at Polytechnic Institute of Brooklyn (now Polytechnic Institute of New York University), then found a job in the semiconductor industry to support his new wife (who also received a degree in chemistry). After working for a couple of years, he pursued a graduate degree at the University of Connecticut to study photochemistry under Dr. Roland Ward.

Klein was recruited to work for Bell Laboratories, and began working on the production of semiconductors. His group was involved in involved in developing etching techniques for semiconductors and methods to prevent different types of contamination in semiconductor production. In February 1966, Klein was in charge of a brainstorming session with several other Bell scientists to design a better process for building FET devices. They first identified the problems with current models and processes; out of that meeting came the idea of using a heavily doped polycrystalline silicon layer as the gate of an FET. The gate was to be supported on dual layers of a silicon nitride and silicon dioxide serving as the gate insulator. Using the FET as a model for integrated circuits, they fabricated and characterized hundreds of FET devices at high yield that exhibited close electrical tolerances. Klein and his colleagues published several papers on their new technology, and applied for patents on their process, though Bell's management was slow to appreciate the breakthrough its scientists had made. After a restructuring, Klein left Bell to work for IBM.

The rest of the industry, however, was quick to adopt and improve the silicon gate technology. There were legal disputes throughout the 1970s, but by that time Klein was at IBM developing photoresist technologies and more efficient processes for manufacturing electronic packaging.

INTERVIEWER

David C. Brock is a senior research fellow with the Center for Contemporary History and Policy of the Chemical Heritage Foundation. As an historian of science and technology, he specializes in oral history, the history of instrumentation, and the history of semiconductor science, technology, and industry. Brock has studied the philosophy, sociology, and history of science at Brown University, the University of Edinburgh, and Princeton University (respectively and chronologically). His most recent publication is *Understanding Moore's Law: Four Decades of Innovation* (Philadelphia: Chemical Heritage Press), 2006, which he edited and to which he contributed.

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