Transcript of an Interview
Conducted by
Cyrus Mody
at
Santa Barbara, California
on
13 and 16 March 2006
(With Subsequent Corrections and Additions)
ACKNOWLEDGEMENT

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Center for Nanotechnology in Society  
University of California, Santa Barbara

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Print Name of Interviewee: Alan Heeger

Signature of Interviewee: ____________________________

Date: ____________________________

Print Name of Interviewer: Cyrus Mody

Date(s) of Interview: March 13th and 16th, 2006
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Alan J. Heeger, interview by Cyrus Mody at Santa Barbara, California, 13 and 16 March 2006 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0337).
ALAN J. HEEGER

1936 Born in Sioux City, Iowa on 22 January

Education

1957 B.S. with High Distinction, physics and mathematics, University of Nebraska
1961 Ph.D., physics, University of California at Berkeley

Professional Experience

University of Pennsylvania
1962-1964 Assistant Professor
1964-1967 Associate Professor
1967-1982 Professor
1974-1981 Director, Laboratory for Research on the Structure of Matter
1981-1982 Acting Vice-Provost for Research

University of Geneva
1968-1969 Visiting Professor of Physics

University of California at Santa Barbara
1982-1999 Director, Institute for Polymers and Organic Solids
1982-present Professor of Physics
1987-present Professor of Materials (Engineering)

University of Utah
1988-present Adjunct Professor of Physics

UNIAX Corporation
1990-1994 Founder and President
1994-present Chief Scientist, Chairman of the Board

Honors

1963-1965 Alfred P. Sloan Foundation Fellow
1968-1969 John Simon Guggenheim Foundation Fellow
1968 American Physical Society Fellow
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<tr>
<td>1983</td>
<td>Oliver E. Buckley Prize for Condensed Matter Physics</td>
</tr>
<tr>
<td>1989</td>
<td>John Scott Award</td>
</tr>
<tr>
<td>1992</td>
<td>Doctor of Science (h.c.), Université d'Etat a Mons, Belgium</td>
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<tr>
<td>1995</td>
<td>Balzan Prize, “Science of New Materials,” Bern, Switzerland</td>
</tr>
<tr>
<td>1996</td>
<td>Doctor of Technology (h.c.), University of Linköping, Sweden</td>
</tr>
<tr>
<td>1996</td>
<td>Doctor of Technology (h.c.), Abo Akademi University, Finland</td>
</tr>
<tr>
<td>1999</td>
<td>Doctor of Humane Letters (h.c.), University of Massachusetts at Lowell</td>
</tr>
<tr>
<td>1999</td>
<td>Doctor of Science (h.c.), University of Nebraska</td>
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<tr>
<td>2000</td>
<td>Nobel Prize in Chemistry</td>
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<tr>
<td>2000</td>
<td>Institute of Physics Fellow, UK</td>
</tr>
<tr>
<td>2001</td>
<td>Doctor of Science (h.c.), Japan Advanced Institute for Science and Technology</td>
</tr>
<tr>
<td>2001</td>
<td>Doctor of Science (h.c.), South China Institute of Science and Technology</td>
</tr>
<tr>
<td>2001</td>
<td>National Academy of Sciences (USA)</td>
</tr>
<tr>
<td>2001</td>
<td>President’s Medal for Distinguished Achievement, University of Pennsylvania</td>
</tr>
<tr>
<td>2001</td>
<td>Chancellor’s Medal, University of California at Santa Barbara</td>
</tr>
<tr>
<td>2001</td>
<td>Korean Academy of Science (Foreign Member)</td>
</tr>
<tr>
<td>2001</td>
<td>Doctor of Philosophy (h.c.), Bar-Ilan University, Israel</td>
</tr>
<tr>
<td>2001</td>
<td>Presidential Chair, University of California at Santa Barbara</td>
</tr>
<tr>
<td>2002</td>
<td>National Academy of Engineering (USA)</td>
</tr>
<tr>
<td>2005</td>
<td>Doctor of Science (h.c.), Trinity College, Dublin</td>
</tr>
<tr>
<td>2005</td>
<td>Albert Einstein Honorary Chair Professor, Chinese Academy of Sciences</td>
</tr>
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</table>
ABSTRACT

Alan J. Heeger begins the interview by describing his early decision to attend college and reasons behind changing his major from electrical engineering to mathematics and physics at the University of Nebraska. After obtaining his undergraduate degree, Heeger enrolled in Cornell University to pursue his interest in theoretical physics. After one year Heeger moved and attended University of California at Berkeley and switched his focus to experimental physics. Upon receiving his Ph.D. under Alan Portis, Heeger took an assistant professorship at the University of Pennsylvania’s physics department. At Penn Heeger’s interests included spin-wave theory, metal physics, the Kondo problem, and nuclear magnetic resonance (NMR) in magnetic materials. After achieving tenure, Heeger took a sabbatical at the University of Geneva to work on metal physics. Before leaving for Geneva, Heeger was introduced to TCNQ and shifted the focus of his research on that upon returning to the United States. Then in 1973, Heeger began investigating polysulfur nitride along with Alan MacDiarmid and Hideki Shirakawa that led to seminal publications on conducting polymers. After twenty years at the University of Pennsylvania, Heeger moved to the University of California at Santa Barbara’s physics department, where he continued to conduct his research and collaboration with other scientists. Heeger concludes the interview by discussing thoughts of his role as a device physicist, and how he can best move technology development forward.

INTERVIEWER

Cyrus Mody is an Associate 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.
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<td>Interest in science. Mother’s influence on pursuing higher education. Deciding on a major. Developing hobbies. Thoughts on creativity.</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Undergraduate degree at University of Nebraska. Stint at Cornell University. Part time work at Lockheed Martin and graduate work at University of California at Berkeley. Pursuing a Ph.D. in experimental physics full time with Alan Portis at Berkeley. Research affiliations with industrial research laboratories.</td>
</tr>
<tr>
<td>20</td>
<td>Career at University of Pennsylvania</td>
</tr>
<tr>
<td></td>
<td>Decision to stay in academia. Accepting a position at Penn. Role in recruitment and learning from Robert Schrieffer. Setting up research and finding funding. Publishing on Spin-wave theory. Thoughts on graduate and undergraduate teaching. Relationships with funding agencies and picking research projects. Summer research at Harwell, UK and one-year sabbatical at University of Geneva.</td>
</tr>
<tr>
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<td>Professional Development</td>
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<td></td>
<td>Learning about and interest in TCNQ. Research community and interest in TTF-TCNQ. Working with small crystals and scientific controversy. Origins of the controversy. Shifting into polysulfur nitride research.</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>Reading Mort Labes’ paper. Collaboration with Alan MacDiarmid. Saturday meetings with MacDiarmid to exchange knowledge. Lessons from TCNQ. Learning about polyacetylene from Hideki Shirakawa in Japan and bringing him to the US. Doping of polyacetylene. Learning about electrochemistry. Winning the Nobel Prize in Chemistry.</td>
</tr>
<tr>
<td>61</td>
<td>Career at University of California at Santa Barbara</td>
</tr>
<tr>
<td></td>
<td>Discussion about the polymer community. Administration position as Vice-Provost of Research. Decision to move to UCSB. Continued relationship with Alan MacDiarmid. Interaction with Schrieffer and other colleagues</td>
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Concluding Thoughts
Thoughts on device physics. Commercial potentials and trying to move technology development forward.

Notes

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NOTES


2. Alan J. Heeger, Alan G. MacDiarmid, and Hideki Shirakawa were awarded the 2000 Nobel Prize in Chemistry for the discovery and development of conductive polymers.

3. Walter Kohn was awarded the 1998 Nobel Prize in Chemistry for his development of the density-functional theory.


6. Kenneth G. Wilson was awarded the Nobel Prize in Physics in 1982 for his theory for critical phenomena in connection with phase transitions.


11. Sir Alexander Fleming, Ernst Boris Chain, and Sir Howard Walter Florey were awarded the Noble Prize in Medicine in 1945 for the discovery of penicillin and its curative effect in various infectious diseases.


14. Leo Esaki and Ivar Giaever were awarded the Noble Prize in Physics in 1973 for their experimental discoveries regarding tunneling phenomena in semiconductors and superconductors, respectively. Brian David Josephson was awarded the Noble Prize in Physics in 1973 for his theoretical predictions of the properties of a supercurrent through a tunnel barrier, in particular those phenomena which are generally known as the Josephson effects.


33. Kenichi Fukui and Roald Hoffmann were awarded the Nobel Prize in Chemistry in 1981 for their theories, developed independently, concerning the course of chemical reactions.
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