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EDUCATION

- Ph.D., Physics, University of Rochester, New York, May 1986
Thesis: An Experimental Study of Magneto-Transport Near the Metal-Insulator Transition in Arsenic-doped Silicon.
- M.A., Physics, University of Rochester, 1982.
- B.S., Physics, University of Delaware, 1980.

ACADEMIC HONORS: Rush Rhees Fellowship, University of Rochester, 1980-83.

EXPERIENCE

- 2006-Present Asst. Professor
Materials Science and Engineering, University of Delaware
- Advises graduate students in thesis research and progress toward graduate degrees. Participates in various department programs.
- 1998-Present Scientist
1996-1998 Manager, Electronic Materials Laboratory
Institute of Energy Conversion, University of Delaware
- Manages solar cell processing laboratories for material deposition and characterization and personnel, and their maintenance and safety. Principal Investigator on several government and industrial contracts. Directs research projects on polycrystalline thin film solar cells and develops new research programs. Oversees progress toward technical goals specified in contracts, and trains and supervises technical and professional staff, and post-doctoral and visiting research fellows.
- 1986-95 Research Associate III
Institute of Energy Conversion, University of Delaware
- Investigated deposition and fabrication of thin film polycrystalline solar cells. Analyzed devices and alternative cell designs.

Characterized optical and electrical properties of semiconductor and transparent conducting oxide thin films.

1982-86

Research Assistant
Condensed Matter Lab, University of Rochester

Measured dc and rf conductivity and dielectric properties of semiconductors at low temperatures and in high magnetic fields. Utilized cryogenic and vacuum techniques and low temperature thermometry. Characterized, prepared and attached contacts to semiconductor samples.

1982-1986

Adjunct Faculty
Learning Development Center, Rochester Institute of Technology,
Rochester, New York

1979

Research Fellow
Institute of Energy Conversion, University of Delaware

PROFESSIONAL SERVICE

Team Leader, National Center For Photovoltaics Thin Film Partnership Program:
National CIS R&D Team, 1997-1999.

Program Committee, 28th IEEE Photovoltaic Specialists Conference, Anchorage AK,
2000.

Program Committee, 29th IEEE Photovoltaic Specialists Conference, New Orleans LA,
2002.

Symposium Co-organizer, "Compound Semiconductor Photovoltaics" at Materials
Research Society 2003 Spring Meeting, San Francisco, 2003. Also Co-editor of
Symposium Proceedings.

Symposium Lead-organizer, "Thin-Film Compound Semiconductor Photovoltaics" at
Materials Research Society 2005 Spring Meeting, San Francisco, 2005. Also Co-editor of
Symposium Proceedings.

Program Area Co-Chair, 4th World Conference On Photovoltaic Energy Conversion,
Waikoloa, HI, 2006.

INVITED / OPENING TALKS

25th IEEE Photovoltaic Specialists Conference, Washington, 1996, "Characterization of
Cu(InGa)Se₂ Solar Cells with High Ga Content."

28th IEEE Photovoltaic Specialists Conference, Anchorage AK, 2000, "Fabrication of
Graded Cu(InGa)Se₂ Films by Inline Evaporation."

NCPV and Solar Program Review Meeting, Denver, 2003, "Ga, Al, and S Alloying in
CuInSe₂: What Limits Wide Bandgap Devices?"

3rd World Conference on Photovoltaic Energy Conversion, Osaka, Japan, 2003,
“Critical Issues For Cu(InAl)Se₂ Thin Film Solar Cells.”

Korean Conference on Innovative Science and Technology, Gyeongju, Korea, 2004,
“Wide Band Gap CuInSe₂-Alloy Thin Film Solar Cells.”

NREL/SNL Photovoltaics Program Review, Lakewood, CO, 2006 “Fabrication and
Characterization of Cu(InGa)Se₂ Solar Cells with Absorber Bandgap from 1.0 to 1.5 eV.”

3rd Workshop on the Future Direction of Photovoltaics, Aogaku Kaikan in Tokyo, 2007,
“Critical Issues for Wide Bandgap CuInSe₂-based Solar Cells”

Materials Research Society, Spring Meeting, San Francisco, 2007, “Bandgap Control for
the Deposition of Cu(InGa)(SeS)₂”

AFFILIATIONS

Materials Research Society
American Vacuum Society

PATENTS

1. “Chemical Surface Deposition of Ultra-Thin Semiconductors,” B. E. McCandless and
W. N. Shafarman, United States Patent 6,537,845, Mar. 25, 2003.

BOOK CHAPTERS

1. “Cu(InGa)Se₂ Solar Cells,” W.N. Shafarman and L. Stolt, Chapter 13 in Handbook of
Photovoltaic Science and Engineering, ed. by A. Luque and S. Hegedus, John Wiley
& Sons, Ltd., 567 (2003).
2. “Defect Studies Using Photocapacitance Spectroscopy in the Copper Indium
Diselenide Alloys,” J.D. Cohen, J.T. Heath and W.N. Shafarman, in Wide Gap
Chalcopyrites, ed. by U. Rau and S. Siebentritt, Springer Scientific, 69 (2005).