

SOLAR SEMINAR SERIES

SPRING 2013 PHOTOVOLTAIC SEMINAR SERIES

RICHARD SCHWARTZ

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**A Partial History of Solar Cell
Modeling at Purdue**



Brief Bio: Richard Schwartz is Dean Emeritus of the Schools of Engineering at Purdue. In his 44 years at Purdue, he also served as the Head of the School of Electrical and Computer Engineering and the Co-Director of the Birck Nanotechnology Center.

He has been involved in solar cell research since 1974, primarily in the detailed modeling of solar cells. He has authored over 100 technical papers. Professor Schwartz was named a Fellow of the IEEE for his research work on the analysis, design and development of high intensity silicon solar cells. His research work received a NASA Recognition Award and the IEEE William Cherry Award for his contributions to the field of photovoltaics.

Professor Schwartz served as the Chairman of the Science and Technology Advisory Committee for the Department of Energy's National Renewable Energy Laboratory (NREL) and on the Advisory Committee for the National Center for Photovoltaics. He was the General Chairman of the 23rd IEEE Photovoltaic Specialists Conference and he chaired the National Research Council's Committee for the assessment of NASA's Solar Power Investment Strategy.

Abstract

There is a long history of the modeling of solar cells at Purdue that has led to the prominence that the work here now enjoys. The early work in this area was not directed at photovoltaic cells as solar cells but as thermophotovoltaic (TPV) cells. This talk will trace the path that was followed from the development and modeling of TPV cells to Interdigitated Back Contact (IBC) cells. We will discuss how this then led to one- and two-dimensional silicon solar cell models. Important contributions to the understanding of how these cells operated and how they should be designed for optimal performance were a result of these early efforts. The silicon cell modeling developed to the point where very reliable predictions could be made as to the effects changes in materials properties and cell designs would have on their performance.

These early successes lead to wide acceptance of the importance of the development of detailed solar cell models. Purdue modeling efforts have covered most of the commercially important cells (as well as many that are not commercially important).

The presentation will cover lessons learned and contributions to the understanding of solar cell operations.

For the apparently simple devices that they are, solar cells are surprisingly sophisticated.

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