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# ***Optical Modeling and Measurements for Solar Energy Systems III***

**Benjamin K. Tsai**  
*Editor*

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## Introduction

The solar energy industry has been growing at a rate of 24% per year in 2009, reaching 6.4 gigawatts deployed in 2009 and projected revenues of \$34 billion in 2013. Production of high quality, reliable, and robust solar energy systems components for the market relies on the same fundamentals: careful measurements and good engineering models. Finding better ways to establish the quantity and quality of solar radiation resources depends upon good measurement techniques and solar radiation models. New approaches to capturing, storing, and converting solar radiation into thermal and electrical energy begin with ideas, transition to theoretical models, and result in physical prototypes and finally production devices. Optical performance and properties measurements and models are crucial for advancing solar energy conversion system technologies. Real time high temporal and spatial frequency measurements of solar radiation and their influence on the ramp rates of photovoltaic technology in particular are becoming critical. Possible high penetration (hundreds of megawatts) of photovoltaic generation requires knowledge by the utility industry of stresses such high penetration may induce on power grid stability. In addition, forecast models are a hot topic and are important utilities to predicting loads and maintenance.

The first two sessions on Solar Radiation Measurements and Modeling Applications were chaired by Mr. Daryl Myers of the National Renewable Energy Laboratory and by Dr. Frank Vignola of the University of Oregon, manager of the university's Solar Monitoring Network. Topics included a broadband radiometric ground station, IR radiative losses, modeled photosynthetically active radiation, solar irradiance, SOLRMAP, PV concentrator performance, a pulsed solar simulator, variable spectra solar light source, and terrestrial solar spectra.

The session on Solar Device and System Performance Measurements and Modeling was chaired by Dr. Christian Gueymard of Solar Consulting Services, internationally recognized author and solar modeling expert. Topics included optical losses in solid state solar cells, selective coatings for solar thermal applications, solar panel installation, collimated flash test, smart solar energy applications, and solar absorbers.

Poster presentations and papers reporting on the measurement of a static daylighting system, wideband solar ultraviolet radiation intensity monitoring, spatial distribution of global irradiation, outdoor test of PV technologies, and biomimetic dye sensitised solar cells rounded out the conference.

We thank the participants, the conference organizing committee, and the institutions sponsoring them, for their contributions resulting in an exceptional conference. The authors and program committee members represent the commitment of themselves and their respective institutions to building an economically stable future for our descendants, one new measurement, one new component, or one new model at a time.

**Benjamin K. Tsai**  
**Daryl R. Myers**