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Introduction

The solar energy industry has seen strong growth in the last decade. While the recent recession has certainly had a big impact on the photovoltaics (PV) industry through a lack of credit that has seen inventories soar and prices for Si modules drop to unprecedented levels, it is expected that in the long run the industry will again see good growth levels. Indeed, the emergence of CdTe thin film technology as a major rival to silicon underscores this point. Conventional silicon and thin film PV technologies are well developed and capable of meeting the clean energy demands of many markets. Nevertheless, there continues to be interest within the research community in developing technologies that can simultaneously reduce cost yet also provide breakthrough performance.

To this effect, research efforts in studying and applying the unique optical, electrical, and structural/architectural properties of nanostructures to solar energy applications, either as novel photonic structures or as new solar cell device structures, continue to flourish. This year's second installment of the conference devoted to this topic (7411: Nanoscale Photonic and Cell Technologies for Photovoltaics II), held at SPIE Optics & Photonics in 2009 as part of the Solar Energy + Technology Symposium, once again demonstrated the strong interest in this field of research.

The first two sessions of the conference were focused on Inorganic Nano Solar Cells. Recent developments in Si and II-VI wire, group IV quantum dots, and II-VI nanocrystal solar cells were presented. The third and fourth sessions were in fact joint session with the Organic Photovoltaics conference, and featured advances in Nanostructured Organic and Hybrid Solar Cells. These included application of fullerenes to bulk heterojunction solar cells, new electrodes, dye-sensitized solar cells, and the new results in plasmonics for excitonic PV devices. The final three sessions of the conference were devoted to the application of Nanophotonics for Photovoltaics, i.e. the use of novel layers and structures for light management in PV applications. After a broad overview of 3rd Generation Photovoltaics, numerous presentations on up-conversion, plasmonics, light trapping, nanowire-based transparent conductors, and photonic bandgap structures, among other topics, were given. A collection of excellent posters on various nanostructured PV topics further contributed to the conference.

The conference was also highlighted by the addition of a panel discussion on Commercialization of Next Generation Solar Technologies, in which experts from academia and industry discussed the prospects and challenges in developing novel PV technologies based on organic and inorganic structures. The panelists were as follows:

Harry A. Atwater, Jr., California Institute of Technology (United States)
Gilles Dennler, Konarka Austria Forschungs und Entwicklungs GmbH (Austria)
Damoder Reddy, Solexant (United States)
Christiana B. Honsberg, Arizona State Univ. (United States)
Darin W. Laird, Plextronics Inc. (United States)
Moritz K. Riede, IAPP, Technische Univ. Dresden (Germany)
Wladek Walukiewicz, RoseStreet Labs (United States)
James H. Ermer, Spectrolab, Inc. (United States)

Some panelists argued Si will continue to be an important technology in the PV industry and hence new technologies enhancing Si would emerge, whereas others argued that novel polymer and nanoscale inorganic solar cells will fundamentally alter the PV landscape in years to come, though it was noted that the various technologies under development are not necessarily mutually exclusive. Researchers working on conventional PV technologies noted an interest in better understanding the unique characteristics of advanced PV concepts, and a strong interest in concentrator PV was also shown by a robust discussion on the topic. The large audience turnout and participation pointed to the continued strong interest in the development of advanced photovoltaic concepts.

Once again, the conference provided an excellent forum for the interchange of advanced/nanoscale photonic and device concepts in photovoltaics. I would like to thank the conference program committee (Drs. E. S. Aydil, A. Salleo, J. Schoonman, S. E. Shaheen, W. G. J. H. M. van Sark, and X. Xu) for their support, as well as the session chairs, authors, and SPIE staff for their help in making this a successful conference. The strong support of Dr. M. Symko-Davies, chair of the 2009 Solar Energy + Technology symposium, is also greatly appreciated.

Loucas Tsakalacos