

# **Third-Generation and Emerging Solar-Cell Technologies**

**MATERIALS RESEARCH SOCIETY**  
**SYMPOSIUM PROCEEDINGS VOLUME 1322**

# **Third-Generation and Emerging Solar-Cell Technologies**

Symposium held April 25–29, 2011, San Francisco, California, U.S.A.

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Materials Research Society  
Warrendale, Pennsylvania



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Cambridge, New York, Melbourne, Madrid, Cape Town,  
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press

32 Avenue of the Americas, New York, NY 10013-2473, USA

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781605112992](http://www.cambridge.org/9781605112992)

Materials Research Society

506 Keystone Drive, Warrendale, PA 15086, USA

<http://www.mrs.org>

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First published 2011

CODEN: MRSPDH

ISBN: 978-1-60511-299-2 Hardback

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## PREFACE

Symposium B, “Third-Generation and Emerging Solar-Cell Technologies,” was held April 26–29 at the 2011 MRS Spring Meeting in San Francisco, California. The symposium was organized and chaired by Prof. Yalin Lu (leading) from the United States Air Force Academy, Prof. M.T. Lusk from Colorado School of Mines, Dr. J.M. Merrill from the United States Air Force Research Laboratories, Dr. S. Bailey from NASA Glenn Research Center, and Dr. A. Franceschetti from National Renewable Energy Laboratory. It attracted about 260 participants from all over the world, making it the largest, longest lasting and best attended regular symposium in the 2011 MRS Spring meeting.

Direct conversion of solar energy to electricity by photovoltaic (PV) devices is an important element of the portfolio of next-generation green power production. Although crystalline Si is currently the dominant material for making solar cells, new solar cells using thin films have been emerging due to their high competitiveness in cost reduction. Even more exotic materials have generated a great deal of excitement as in, for instance, assemblies composed of quantum dots and/or wires in which quantum confinement is used as a design parameter. Dye cells and organic PVs are also being pursued as affordable and low-cost paradigms. All such new and promising materials systems present challenges associated with the efficient absorption and collection of generated carriers, and the associated roadblocks stand between concept and practical implementation. This symposium proceedings volume represents the recent advances in all abovementioned areas. Each paper in this volume provides a glimpse of the exciting recent developments occurring in surface plasmonic resonance absorption enhancement, quantum dots, luminescence, surface nanostructure fabrication, et al. We hope that these papers convey the breadth of exciting advancements happening in the area of emerging third-generation solar cell technologies.

Yalin Lu  
Mark T. Lusk  
John M. Merrill  
Sheila Bailey  
Alberto Franceschetti

October 2011



## ACKNOWLEDGMENTS

The papers published in this volume result from MRS Spring 2011 Symposium B. We sincerely thank all of the oral and poster presenters of the symposia who contributed to this proceedings volume. We also thank the reviewers of these manuscripts, who provided valuable feedback to the editors and to the authors. It is an understatement to say that the symposia and the proceedings would not have happened without the organizational help of the Materials Research Society and its staff, particularly the Publications staff for guiding us smoothly through the submission/review process and constantly nudging us to move forward. The organizers of Symposium B thank the National Renewable Energy Laboratory and Naval Research Laboratory for their financial support.

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