

PROCEEDINGS OF SPIE

***Organic Photonic Materials
and Devices XI***

Robert L. Nelson

François Kajzar

Toshikuni Kaino

Editors

27–29 January 2009

San Jose, California United States

Volume 7213

Proceedings of SPIE, 0277-786X, v. 7213

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Organic Photonic Materials and Devices XI*, edited by Robert L. Nelson, François Kajzar, Toshikuni Kaino, Proceedings of SPIE Vol. 7213 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 0277-786X
ISBN 9780819474599

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org

Copyright © 2009, Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/09/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



SPIEDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-27, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

vii Conference Committee

PHOTOVOLTAIC AND DISPLAY MATERIALS I

- 7213 02 **Electron injection behavior from the magnesium electrode into a family of electron-transporting amorphous molecular materials, α,ω -bis(dimesitylboryl)oligothiophene (Keynote Paper)** [7213-01]
F. Zhang, T. Noda, H. Kageyama, Osaka Univ. (Japan); Y. Shirota, Osaka Univ. (Japan) and Fukui Univ. of Technology (Japan)
- 7213 03 **Electrical doping for high performance organic light emitting diodes (Invited Paper)** [7213-02]
J.-J. Kim, D.-S. Leem, J.-H. Lee, Seoul National Univ. (Korea, Republic of)

PHOTOVOLTAIC AND DISPLAY MATERIALS II

- 7213 09 **C12-PTV with controlled regioregularity for photovoltaic application** [7213-08]
C. Zhang, E. Annih, R. Li, S.-S. Sun, Norfolk State Univ. (United States)

SPECIALTY MATERIALS FOR PHOTONICS

- 7213 0A **Monte Carlo study of tunable negative-zero-positive index of refraction in nanosphere dispersed liquid crystals (Invited Paper)** [7213-09]
W. Walasik, M. Jarema, G. Pawlik, R. Orlik, A. C. Mitus, Wroclaw Univ. of Technology (Poland); F. Kajzar, Lab. POMA, CNRS, Univ. d'Angers (France)
- 7213 0B **Organic/inorganic-polyimide nanohybrid materials for advanced opto-electronic applications (Invited Paper)** [7213-10]
S. Ando, Tokyo Institute of Technology (Japan)
- 7213 0C **Spectral-domain measurement of photo-induced birefringence in polymer** [7213-11]
M. R. Cardoso, C. R. Mendonça, L. Misoguti, Univ. de São Paulo (Brazil)

NANO- AND BIOMATERIALS

- 7213 0E **Bioapplication of plasmonic nanosheet (Invited Paper)** [7213-13]
K. Tamada, K. Michioka, Tohoku Univ. (Japan) and Tokyo Institute of Technology (Japan); X. Li, Tokyo Institute of Technology (Japan); Y. Ikezoe, RIKEN (Japan); M. Saito, K. Otsuka, Tohoku Univ. (Japan) and Tokyo Institute of Technology (Japan)

APPLICATIONS

- 7213 0I **Applications of the DNA-based material for lasing and dynamic holography (Invited Paper)** [7213-17]
J. Mysliwiec, L. Sznitko, B. Smoczynska, S. Bartkiewicz, A. Miniewicz, Wroclaw Univ. of Technology (Poland); B. Sahraoui, F. Kajzar, Lab. POMA, CNRS, Univ. d'Angers (France)
- 7213 0L **Application of polymer graded-index materials for aberration correction of progressive addition lenses** [7213-20]
Y. Shitanoki, Keio Univ. (Japan); A. Tagaya, Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency (Japan)

NONLINEAR OPTICS II

- 7213 0Q **Two-photon absorption spectroscopy of corroles** [7213-25]
A. Rebane, Montana State Univ., Bozeman (United States) and National Institute of Chemical Physics and Biophysics (Estonia); N. Makarov, M. Drobizhev, Montana State Univ., Bozeman (United States); B. Koszarna, M. Galezowski, D. T. Gryko, Institute of Organic Chemistry (Poland)
- 7213 0T **Nonlinear forms of laser beam propagation in a photopolymerizable medium** [7213-28]
A. B. Villafranca, K. Saravanamuttu, McMaster Univ. (Canada)

WAVEGUIDE MATERIALS

- 7213 0V **PMT connectors for multi-channel film waveguides (Invited Paper)** [7213-30]
Y. Hatakeyama, S. Imamura, NTT Advanced Technology Corp. (Japan); J. Kobayashi, NTT Corp. (Japan); H. Takahara, NTT Advanced Technology Corp. (Japan)
- 7213 0W **Birefringence analysis of a photonics polymer doped with a birefringent crystal** [7213-31]
Y. Yamada, Keio Univ. (Japan); A. Tagaya, Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency (Japan)
- 7213 0X **Dopant designing for thermally stable graded index plastic optical fiber** [7213-32]
Y. Yamaki, Keio Univ. (Japan); A. Kondo, Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency (Japan)
- 7213 0Y **Fabrication and characterization of waveguide and grating structures induced by ultraviolet radiation in polymers with a shortened writing process** [7213-33]
M. Koerdrt, Bremer Institut für Angewandte Strahltechnik GmbH (Germany)
- 7213 10 **Reduction of orientational birefringence of polymer using nanoparticles** [7213-35]
T. Otani, Keio Univ. (Japan); A. Tagaya, Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency (Japan)

MISCELLANEOUS I

- 7213 13 **Dielectric and pyroelectric properties of LiTaO₃:P(VDF-TrFE) composite films** [7213-38]
A. K. Batra, J. Corda, P. Guggilla, M. D. Aggarwal, M. E. Edwards, Alabama A&M Univ.
(United States)
- 7213 14 **Interface effects on the defect state formation in organic devices** [7213-39]
T. P. Nguyen, C. Renaud, Institute des Matériaux Jean Rouxel, Univ. of Nantes, CNRS (France)

MISCELLANEOUS II

- 7213 18 **Power flow equation analysis of graded-index polymer optical fibers** [7213-43]
K. Nehashi, Keio Univ. (Japan); Y. Koike, Keio Univ. (Japan) and Japan Science and
Technology Agency (Japan)
- 7213 1A **Simple evaluation of multimode polymer optical waveguide** [7213-45]
O. Sugihara, B. Cai, T. Kaino, Tohoku Univ. (Japan)

POSTER SESSION

- 7213 1B **Preparation and characterization of phosphorescence organic light emitting diodes using PVK:Ir(ppy)₃ emission layer** [7213-46]
H. M. Lee, S. C. Gong, J. G. Chang, S. O. Ryu, M. S. Gong, J. Y. Lee, Dankook Univ. (Korea,
Republic of); Y. C. Chang, Korea Univ. of Technology and Education (Korea, Republic of);
H. J. Chang, Dankook Univ. (Korea, Republic of)
- 7213 1C **One dimensional polymeric photonic crystal doped with second-order nonlinear optical chromophore** [7213-47]
A. Inoue, S. Inoue, S. Yokoyama, Kyushu Univ. (Japan); K. Kojima, K. Yasui, M. Ozawa,
K. Odoi, Nissan Chemical Industries, Ltd. (Japan)
- 7213 1E **High luminance efficiency and low voltage organic light-emitting diodes with NPB/LiF multiple layers** [7213-50]
C.-H. Chen, Cheng Shiu Univ. (Taiwan)
- 7213 1I **Enhancing the two-photon excited fluorescence by two-dimensional nonlinear optical-polymer photonic crystals** [7213-54]
S. Inoue, S. Yokoyama, Kyushu Univ. (Japan)
- 7213 1J **Numerical simulation on white OLEDs with dotted-line doped emitting layers** [7213-55]
S.-H. Chang, C.-Y. Wen, Y.-H. Huang, Y.-K. Kuo, National Changhua Univ. of Education
(Taiwan)
- 7213 1N **Dispersion of single-walled carbon nanotubes using polyelectrolytes** [7213-59]
G. Aldea, Queen's Univ. (Canada) and Petru Poni Institute of Macromolecular Chemistry
(Romania); J. M. Nunzi, Queen's Univ. (Canada)

Author Index

Conference Committee

Symposium Chair

James G. Grote, Air Force Research Laboratory (United States)

Symposium Cochair

E. Fred Schubert, Rensselaer Polytechnic Institute (United States)

Program Track Chair

James G. Grote, Air Force Research Laboratory (United States)

Conference Chairs

Robert L. Nelson, Air Force Research Laboratory (United States)

François Kajzar, Université d'Angers (France)

Toshikuni Kaino, Tohoku University (Japan)

Program Committee

Chantal Andraud, École Normale Supérieure de Lyon (France)

Werner J. Blau, Trinity College Dublin (Ireland)

Christoph Bubeck, Max-Planck-Institut für Polymerforschung (Germany)

Darnell E. Diggs, Air Force Research Laboratory (United States)

Alain F. Fort, Institut de Physique et Chimie des Matériaux de Strasbourg (France)

James G. Grote, Air Force Research Laboratory (United States)

F. Kenneth Hopkins, Air Force Research Laboratory (United States)

Alex K. -Y. Jen, University of Washington (United States)

Michael H. Jin, The University of Texas at Arlington (United States)

Eunkyoung Kim, Yonsei University (Korea, Republic of)

Jang-Joo Kim, Seoul National University (Korea, Republic of)

Nakjoong Kim, Hanyang University (Korea, Republic of)

Junya Kobayashi, Nippon Telegraph and Telephone Corp. (Japan)

Isabelle N. Ledoux-Rak, École Normale Supérieure de Cachan (France)

Charles Y. C. Lee, Air Force Office of Scientific Research (United States)

Kwang-Sup Lee, Hannam University (Korea, Republic of)

Misoon Mah, Air Force Research Laboratory (United States)

Seth R. Marder, Georgia Institute of Technology (United States)

Antoni Cz. Mitus, Wroclaw University of Technology (Poland)

Robert A. Norwood, College of Optical Sciences/The University of Arizona (United States)
Jean-Michel Nunzi, Queen's University (Canada)
Susanna Orlic, Technische Universität Berlin (Germany)
Ileana Rau, Universitatea Politehnica din Bucuresti (Romania)
Kenneth D. Singer, Case Western Reserve University (United States)
Don J. Smith, U.S. Air Force (United Kingdom)
Rebecca E. Taylor, Lockheed Martin Corp. (United States)
Toshiyuki Watanabe, Tokyo University of Agriculture and Technology (Japan)

Session Chairs

- 1 Photovoltaic and Display Materials I
Robert L. Nelson, Air Force Research Laboratory (United States)
- 2 Photovoltaic and Display Materials II
Hiroshi Kageyama, Osaka University (Japan)
- 3 Specialty Materials for Photonics
François Kajzar, Université d'Angers (France)
- 4 Nano- and Biomaterials
Robert A. Norwood, College of Optical Sciences/The University of Arizona (United States)
- 5 Applications
Ileana Rau, Universitatea Politehnica din Bucuresti (Romania)
- 6 Nonlinear Optics I
Toshikuni Kaino, Tohoku University (Japan)
- 7 Nonlinear Optics II
Kenneth D. Singer, Case Western Reserve University (United States)
- 8 Waveguide Materials
Charles Y. C. Lee, Air Force Office of Scientific Research (United States)
- 9 Miscellaneous I
Jean-Michel Nunzi, Queen's University (Canada)
- 10 Miscellaneous II
Kwang-Sup Lee, Hannam University (Korea, Republic of)