PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 7051

, "Front Matter: Volume 7051," Proc. SPIE 7051, Organic Light Emitting Materials and Devices XII, 705101 (25 September 2008); doi: 10.1117/12.813257

SPIE.

Event: Photonic Devices + Applications, 2008, San Diego, California, United States

PROCEEDINGS OF SPIE

Organic Light Emitting Materials and Devices XII

**Franky So
Chihaya Adachi**
Editors

**10–12 August 2008
San Diego, California, USA**

Sponsored and Published by
SPIE

Volume 7051

Proceedings of SPIE, 0277-786X, v. 7051

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 Light Emitting Materials and Devices XII*, edited by Franky So, Chihaya Adachi, Proceedings of SPIE Vol. 7051 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X

ISBN 9780819472717

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 © 2008, 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/08/\$18.00.

Printed in the United States of America.

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

SPIDigitalLibrary.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, 20-2Z, 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

- ix Conference Committee
- xi Introduction
- xiii *Why the developing world is the perfect market place for solid state lighting (Plenary Paper) [7058-101]*
C. Schultz, *Light Up The World (Canada)*; I. Platonova, G. Doluweera, D. Irvine-Halliday, *Light Up The World (Canada)* and Univ. of Calgary (Canada)

SESSION 1 MATERIALS

- 7051 04 **Geometric and electronic structures of a hole-transport material, TPD, and related materials studied by DFT calculations and solid-state NMR (Invited Paper) [7051-03]**
H. Kaji, T. Yamada, Kyoto Univ. (Japan)
- 7051 05 **Novel hole transport materials for organic light emitting devices (Invited Paper) [7051-04]**
J. Shi, E. Forsythe, D. Morton, Army Research Lab. (United States)
- 7051 07 **New developments in photochromic materials showing large change in the refractive index [7051-06]**
A. Bianco, Istituto di Astrofisica Spaziale e Fisica Cosmica, INAF (Italy) and Politecnico di Milano (Italy); C. Bertarelli, G. Dassa, G. Toso, Politecnico di Milano (Italy); M. Lanata, S. M. Pietralunga, CoreCom (Italy); M. Martinelli, G. Zerbi, Politecnico di Milano (Italy)
- 7051 08 **Color tuning by changing the substituent of highly luminescent iridium(III) complexes (Invited Paper) [7051-07]**
U. J. Weinaug, S. Ammermann, H. Gargouri, M. Hoping, Technical Univ. Braunschweig (Germany); P. Erk, K. Kahle, Ch. Lennartz, O. Molt, I. Münster, BASF SE (Germany); M. Tamm, W. Kowalsky, H.-H. Johannes, Technical Univ. Braunschweig (Germany)

SESSION 2 PROCESSING

- 7051 0A **Characterization and optimization of the deposition process of aluminum top electrodes for organic devices [7051-09]**
S. Mozer, D. Schneidenbach, H. Blei, Univ. Braunschweig (Germany); M. Lehnhardt, Physikalisch-Technische Bundesanstalt (Germany); T. Riedl, M. Hoping, H.-H. Johannes, W. Kowalsky, Univ. Braunschweig (Germany)

- 7051 OB **Highly efficient green phosphorescent organic light-emitting diodes with hybrid device geometry** [7051-10]
A. Haldi, B. Dornier, A. Sharma, Georgia Institute of Technology (United States);
R. D. Hreha, Univ. of Arizona (United States); J.-Y. Cho, S. R. Marder, B. Kippelen, Georgia Institute of Technology (United States)
- 7051 OD **Improving the performance of PHOLEDs by using dual doping (Invited Paper)** [7051-12]
V. I. Adamovich, M. S. Weaver, J. J. Brown, Universal Display Corp. (United States)

SESSION 3 DEGRADATION

- 7051 OG **Optically detected magnetic resonance (ODMR) studies of trions in organic light-emitting materials and OLEDs and their possible relation to long-term OLED degradation (Invited Paper)** [7051-14]
Y. Chen, M. Cai, T. Xiao, E. Hellerich, J. Shinar, Ames Lab., USDOE, and Iowa State Univ. (United States)
- 7051 OI **Chemical transformations of common hole transport materials in operating OLED devices (Invited Paper)** [7051-16]
D. Kondakov, Eastman Kodak Co. (United States)
- 7051 OJ **Comprehensive simulation of light-emitting and light-harvesting organic devices (Invited Paper)** [7051-70]
B. Ruhstaller, Fluxim, Inc. (Switzerland) and Zurich Univ. of Appl. Sciences (Switzerland);
T. Flatz, D. Rezzonico, Fluxim, Inc. (Switzerland); M. Moos, N. Reinke, E. Huber,
R. Häusermann, B. Perucco, Zurich Univ. of Appl. Sciences (Switzerland)

SESSION 4 DEVICE PHYSICS

- 7051 OK **Does giant surface potential modify the performance of Alq₃-based OLED?: Voltage shift and charge traps induced by light irradiation** [7051-17]
Y. Noguchi, N. Sato, Y. Tanaka, Y. Nakayama, H. Ishii, Chiba Univ. (Japan)
- 7051 OM **Optimization of white OLEDs based on charge carrier conduction properties of phosphorescent emitting layers (Invited Paper)** [7051-19]
C. Lee, H.-I. Baek, J. Kwak, J. Y. Kim, Seoul National Univ. (South Korea); B. D. Chin, Korea Institute of Science and Technology (South Korea)
- 7051 OP **A new door for molecular-based organic light-emitting diodes** [7051-22]
J.-H. Jou, C.-C. Chen, W.-B. Wang, M.-F. Hsu, C.-J. Wang, National Tsing Hua Univ. (Taiwan);
C.-T. Chen, M.-F. Wu, H.-Y. Chen, J.-J. Shyue, Academia Sinica (Taiwan); C.-L. Chin, ITRI (Taiwan)
- 7051 OQ **Realizing white phosphorescent 100 lm/W OLED efficacy** [7051-23]
B. W. D'Andrade, J. Esler, C. Lin, V. Adamovich, S. Xia, M. S. Weaver, R. Kwong, J. J. Brown, Universal Display Corp. (United States)
- 7051 OR **Efficient simple structure phosphorescent organic light emitting devices with narrow band gap fluorescent hosts** [7051-24]
T. J. Park, W. S. Jeon, J. H. Kwon, Kyung Hee Univ. (South Korea)

SESSION 5 NOVEL DEVICES AND DISPLAYS

- 7051 0T **Oligofluorene derivative in a host-guest system with a red-emitter: molecular packing effect on the host bimolecular recombination and guest ASE threshold reduction (Invited Paper)** [7051-26]
J. Cabanillas-Gonzalez, IFN-CNR, ULTRAS-INFM, Politecnico di Milano (Italy); S. Toffanin, R. Capelli, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy); K.-T. Wong, National Taiwan Univ. (Taiwan); M. Muccini, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy)
- 7051 0U **Current development status and issues of AMOLED toward an invaluable display (Invited Paper)** [7051-27]
M.-H. Kim, W. J. Song, H. D. Kim, H. K. Chung, Samsung SDI Co., Ltd. (South Korea)
- 7051 0V **FDTD simulations of external light out-coupling efficiency of organic field-effect transistors** [7051-28]
R. Gehlhaar, M. Yahiro, C. Adachi, Kyushu Univ. (Japan)

SESSION 6 INTERFACES

- 7051 0Z **Metal/fullerene electrode structure: physics and device applications (Invited Paper)** [7051-32]
M. G. Helander, Z. B. Wang, Z. H. Lu, Univ. of Toronto (Canada)
- 7051 11 **Electronic structure of doping in organic semiconductor (Invited Paper)** [7051-34]
H. Ding, Y. Gao, Univ. of Rochester (United States)

SESSION 7 INJECTION AND TRANSPORT

- 7051 12 **Charge carrier injection and transport in organic thin films (Invited Paper)** [7051-35]
T. Matsushima, G.-H. Jin, Y. Kanai, T. Yokota, S. Kitada, T. Kishi, H. Murata, Japan Advanced Institute of Science and Technology (Japan)
- 7051 16 **Solution processed organic light-emitting diodes with improved cathode interfacial structure (Invited Paper)** [7051-39]
J.-H. Li, Y. Yang, Univ. of California, Los Angeles (United States)

SESSION 8 OLEDs AND SOLID STATE LIGHTING: JOINT SESSION WITH CONFERENCE 7058

- 7051 19 **High-performance OLEDs and their application to lighting (Invited Paper)** [7051-41]
N. Ide, H. Tsuji, N. Ito, H. Sasaki, T. Nishimori, Y. Kuzuoka, K. Fujihara, T. Miyai, T. Komoda, Matsushita Electric Works, Ltd. (Japan)
- 7051 1A **OLEDs for lighting applications (Invited Paper)** [7051-42]
V. van Elsbergen, H. Boerner, H.-P. Löbl, C. Goldmann, S. P. Grabowski, E. Young, G. Gaertner, H. Greiner, Philips Research Europe Aachen (Germany)

SESSION 9 CHARGE INJECTION AND TRANSPORT IN ORGANIC LIGHT-EMITTING DIODES AND SOLAR CELLS: JOINT SESSION WITH CONFERENCE 7052

- 7051 1B **Carrier transport in molecularly doped organic materials (Invited Paper)** [7051-43]
S. K. So, K. K. Tsung, Hong Kong Baptist Univ. (Hong Kong China)
- 7051 1C **Investigations of electron-injection mechanisms and interfacial chemical reactions of Bphen doped with rubidium carbonate in OLEDs** [7051-44]
M.-H. Chen, National Taiwan Univ. (Taiwan); D.-S. Leem, Seoul National Univ. (South Korea); C. T. Lin, National Taiwan Univ. (Taiwan); G. R. Lee, National Taiwan Univ. (Taiwan) and National Synchrotron Radiation Research Ctr. (Taiwan); T.-W. Pi, National Synchrotron Radiation Research Ctr. (Taiwan); J.-J. Kim, Seoul National Univ. (South Korea); C.-I. Wu, National Taiwan Univ. (Taiwan)
- 7051 1D **Charge injecting layers for admittance spectroscopy (Invited Paper)** [7051-45]
M. Hopping, Technische Univ. Braunschweig (Germany); C. Schildknecht, BASF Societas Europaea (Germany); H. Gargouri, T. Riedl, M. Tilgner, H.-H. Johannes, W. Kowalsky, Technische Univ. Braunschweig (Germany)

SESSION 10 ORGANIC LASERS: JOINT SESSION WITH CONFERENCE 7049

- 7051 1E **Light-emitting diode pumped polymer lasers (Invited Paper)** [7051-46]
G. A. Turnbull, Y. Yang, P. Shaw, A. Ruseckas, I. D. W. Samuel, Univ. of St Andrews (United Kingdom)
- 7051 1F **Ultrafast optical modulation of polymer nano-structured lasers** [7051-47]
S. Perissinotto, M. Carvelli, M. Zavelani-Rossi, G. Lanzani, C. Bertarelli, G. Zerbi, Politecnico di Milano (Italy); M. Salerno, L. Troisi, G. Gigli, National Nanotechnology Labs. of INFN-CNR (Italy)

POSTER SESSION

- 7051 1M **Determination of carrier mobility of amorphous organic electronic material by thin film transistor configuration** [7051-54]
C. H. Cheung, K. K. Tsung, S. K. So, Hong Kong Baptist Univ. (Hong Kong China)
- 7051 1O **High efficiency green phosphorescent OLEDs with long lifetime by using novel host material** [7051-57]
E.-S. Yu, N.-S. Kim, Y.-H. Kim, E.-S. Kang, M.-Y. Chae, T.-W. Chang, Cheil Industries Inc. (South Korea)
- 7051 1S **Mechanism of hole accumulation at α -NPD/Alq₃ interface studied by displacement current measurement** [7051-62]
N. Sato, Y. Noguchi, Y. Tanaka, Y. Nakayama, H. Ishii, Chiba Univ. (Japan)
- 7051 1T **Effects of triplet energy confinement by charge transporting layers on blue phosphorescent organic light emitting diodes** [7051-63]
J. Lee, N. Chopra, S.-H. Eom, Y. Zheng, J. Xue, F. So, Univ. of Florida (United States)

- 7051 1V **Mechanism of LiF interlayer for electron injection** [7051-65]
K. Park, H. Ding, Univ. of Rochester (United States); F. So, Univ. of Florida (United States); Y. Gao, Univ. of Rochester (United States)
- 7051 1W **Increased efficient copolymers with PFV and PPDFV for light emitting diodes** [7051-66]
J. K. Kim, Y. Jin, Pusan National Univ. (South Korea); S. H. Park, Gwangju Institute of Science and Technology (south Korea); J. Jung, J. Y. Shim, Pusan National Univ. (South Korea); K. Lee, Gwangju Institute of Science and Technology (South Korea); H. Suh, Pusan National Univ. (South Korea)
- 7051 1X **Light-emitting poly(dendrimer)s** [7051-67]
J. P. Gunning, K. A. Knights, Univ. of Oxford (United Kingdom); J.-C. Ribierre, R. E. Harding, J. W. Levell, Univ. of St. Andrews (United Kingdom); P. L. Burn, Univ. of Oxford (United Kingdom) and The Univ. of Queensland (Australia); I. D. W. Samuel, Univ. of St. Andrews (United Kingdom)

Author Index

Conference Committee

Symposium Chair

Zakya H. Kafafi, National Science Foundation (United States)

Conference Chair

Franky So, University of Florida (United States)

Conference Cochair

Chihaya Adachi, Kyushu University (Japan)

Program Committee

Alasdair J. Campbell, Imperial College London (United Kingdom)

Brian W. D'Andrade, Universal Display Corporation (United States)

Andrew B. Holmes, Bio21 Molecular Science and Biotechnology
Institute (Australia)

Changhee Lee, Seoul National University (South Korea)

Chun Sing Lee, City University of Hong Kong (Hong Kong China)

Michele Muccini, Consiglio Nazionale delle Ricerche (Italy)

Hideyuki Murata, Japan Advanced Institute of Science and
Technology (Japan)

Soo Jin Park, Samsung SDI Company Ltd. (South Korea)

Ifor D. Samuel, University of St. Andrews (United Kingdom)

Linda S. Sapochak, Pacific Northwest National Laboratory (United
States)

Joseph Shinar, Iowa State University (United States)

Session Chairs

- 1 Materials
 Chihaya Adachi, Kyushu University (Japan)
- 2 Processing
 Franky So, University of Florida (United States)
- 3 Degradation
 Michele Muccini, Consiglio Nazionale delle Ricerche (Italy)

- 4 Device Physics
Linda S. Sapochak, Pacific Northwest National Laboratory (United States)
- 5 Novel Devices and Displays
Chung-Chih Wu, National Taiwan University (Taiwan)
- 6 Interfaces
Alasdair J. Campbell, Imperial College London (United Kingdom)
- 7 Injection and Transport
Chun Sing Lee, City University of Hong Kong (Hong Kong China)
- 8 Solid State Lighting and OLEDs Plenary Session
Franky So, University of Florida (United States)
- 9 OLEDs and Solid State Lighting: Joint Session with Conference 7058
Franky So, University of Florida (United States)
Ian Ferguson, Georgia Institute of Technology (United States)
- 10 Charge Injection and Transport in Organic Light-Emitting Diodes and Solar Cells: Joint Session with Conference 7052
Franky So, University of Florida (United States)
Ian Ferguson, Georgia Institute of Technology (United States)
- 11 Organic Lasers: Joint Session with Conference 7049
Joseph Shinar, Iowa State University (United States)

Introduction

We are pleased to present the Proceedings of the Twelfth Conference on Organic Light-Emitting Materials and Devices. The conference consisted of 61 oral presentations organized into 11 sessions over three days and an evening poster session with 16 presentations. The large number of presentations indicates the strong interest in OLED research for flat panel displays as well as in solid state lighting as the technology is maturing. The key topics presented at the conference include interfaces, transport, degradation, and processing, which are also relevant to organic solar cells, organic transistors, and organic laser diodes.

All manuscripts in this volume have been refereed. We would like to thank the authors for their contributions to this volume. The contributions of the organizing committee, session chairs, and SPIE staff are also gratefully appreciated.

Franky So
Chihaya Adachi