PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 6911

, "Front Matter: Volume 6911," Proc. SPIE 6911, Emerging Liquid Crystal Technologies III, 691101 (5 February 2008); doi: 10.1117/12.791665

SPIE.

Event: Integrated Optoelectronic Devices 2008, 2008, San Jose, California, United States

PROCEEDINGS OF SPIE

Emerging Liquid Crystal Technologies III

Liang-Chy Chien
Editor

20–22 January 2008
San Jose, California, USA

Sponsored and Published by
SPIE

Volume 6911

Proceedings of SPIE, 0277-786X, v. 6911

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 *Emerging Liquid Crystal Technologies III*, edited by Liang-Chy Chien, Proceedings of SPIE Vol. 6911 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X

ISBN 9780819470867

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

vii *Conference Committee*

SESSION 1 LIQUID CRYSTAL DISPLAYS

- 6911 03 **In-plane switching of a twisted-nematic liquid crystal cell for single-cellgap transreflective display (Invited Paper)** [6911-03]
T.-H. Yoon, G. S. Lee, J. H. Lee, D. H. Song, J. C. Kim, Pusan National Univ. (South Korea); D. L. Park, S. S. Hwang, D. H. Kim, S. I. Park, LG. Philips LCD (South Korea)
- 6911 04 **Liquid crystal surface alignments by using films composed of magnetic nanoparticles (Invited Paper)** [6911-04]
R.-P. Pan, H.-Y. Wu, C.-F. Hsieh, National Chiao Tung Univ. (Taiwan)

SESSION 2 ELECTRO-OPTICAL AND PHOTONIC MATERIALS

- 6911 05 **Extraordinary properties of nematic phases of bent-core liquid crystals (Invited Paper)** [6911-05]
A. Jáklí, M. Chambers, J. Harden, M. Madhabi, R. Teeling, J. Kim, Q. Li, Kent State Univ. (USA); G. G. Nair, Kent State Univ. (USA) and Ctr. for Liquid Crystal Research (India); N. Éber, K. Fodor-Csorba, Research Institute for Solid State Physics and Optics (Hungary); J. T. Gleeson, S. Sprunt, Kent State Univ. (USA)
- 6911 06 **Effects of functionalized metal and semiconductor nanoparticles in nematic liquid crystal phases (Invited Paper)** [6911-06]
H. Qi, B. Kinkad, T. Hegmann, Univ. of Manitoba (Canada)
- 6911 07 **Designing chromonic mesogens for the fabrication of anisotropic optical materials (Invited Paper)** [6911-07]
S.-W. Tam-Chang, L. Huang, A. Gyan, W. Seo, D. Mahinay, I. K. Iverson, Univ. of Nevada, Reno (USA)
- 6911 08 **Flexible and reflective polarizer-free liquid crystal displays using dye-doped liquid crystal gels** [6911-08]
Y.-H. Lin, J.-M. Yang, National Chiao Tung Univ. (Taiwan); S.-C. Jeng, Y.-R. Lin, C.-C. Liao, Industrial Technology Research Institute (Taiwan)

SESSION 3 ACTUATORS, MICROPUMPS, AND ROBOTS

- 6911 09 **3D-structured liquid crystal networks formed by dichroic photoinitiator initiated photopolymerization (Invited Paper)** [6911-09]
B. Serrano-Ramón, Eindhoven Univ. of Technology (Netherlands); Ch. Kjellander, Philips Research Labs. (Netherlands); S. Zakerhamidi, C. W. M. Bastiaansen, Eindhoven Univ. of Technology (Netherlands); D. J. Broer, Eindhoven Univ. of Technology (Netherlands) and Philips Research Labs. (Netherlands)
- 6911 0A **Modeling liquid crystal elastomers: actuators, pumps, and robots (Invited Paper)** [6911-10]
R. L. B. Selinger, B. L. Mbanga, J. V. Selinger, Kent State Univ. (USA)
- 6911 0B **A photochromic main-chain liquid crystalline polymer and its photo-stimulated actuating properties (Invited Paper)** [6911-11]
M.-H. Lee, Chonbuk National Univ. (South Korea) and Kent State Univ. (USA); H. J. Choi, K.-U. Jeong, Chonbuk National Univ. (South Korea); L.-C. Chien, Kent State Univ. (USA)

SESSION 4 LASING, TWEEZING, AND NANOPARTICLE ASSEMBLIES

- 6911 0C **Nematic colloidal assemblies: toward photonic crystals and metamaterials (Invited Paper)** [6911-12]
S. Žumer, Univ. of Ljubljani (Slovenia) and J. Stefan Institute (Slovenia); I. Muševic, J. Stefan Institute (Slovenia) and Univ. of Ljubljani (Slovenia); M. Ravnik, Univ. of Ljubljani (Slovenia); M. Škarabot, J. Stefan Institute (Slovenia); I. Poberaj, D. Babič, Univ. of Ljubljani (Slovenia); U. Tkalec, J. Stefan Institute (Slovenia)

SESSION 5 THz FILTERS AND FRESNEL LENSES

- 6911 0H **Photonics and flexible display applications of phase-separated liquid crystals (Invited Paper)** [6911-17]
K.-S. Bae, Y. Choi, Hanyang Univ. (South Korea); M. Y. Jin, Image Lab Corp. (South Korea); J.-W. Jung, LG-Philips LCD (South Korea); J.-H. Kim, Hanyang Univ. (South Korea)
- 6911 0I **Fresnel lenses based on dye-doped liquid crystals (Invited Paper)** [6911-18]
L.-C. Lin, K.-T. Cheng, C.-K. Liu, C.-L. Ting, H.-C. Jau, T.-H. Lin, A.-G. Y. Fuh, National Cheng Kung Univ. (Taiwan)
- 6911 0J **Tunable optical properties of photonic crystals and semiconductor microdisks using liquid crystals (Invited Paper)** [6911-19]
K. A. Piegdon, Univ. of Duisburg-Essen (Germany); H. Matthias, Univ. of Paderborn (Germany); C. Meier, Univ. of Duisburg-Essen (Germany); H.-S. Kitzerow, Univ. of Paderborn (Germany)

SESSION 6 POLYMER/LIQUID CRYSTAL COMPOSITES

- 6911 0L **Dynamics of phase separation and morphology of polymer stabilized liquid crystals** [6911-22]
L. Li, C. O. Catanescu, L.-C. Chien, Kent State Univ. (USA)

- 6911 OM **Electrically switchable optical vortex generated by a computer-generated hologram recorded in polymer-dispersed liquid crystals (Invited Paper)** [6911-23]
Y. J. Liu, European Lab. for Non-Linear Spectroscopy (Italy) and Nanyang Technological Univ. (Singapore); X. W. Sun, Nanyang Technological Univ. (Singapore)

SESSION 7 ORGANIC SOLAR CELLS

- 6911 ON **Novel columnar LCs for a new generation of organic solar cells (Invited Paper)** [6911-24]
H. Bock, N. Buffet, E. Grelet, Ctr. National de la Recherche Scientifique, Univ. Bordeaux I, CNRS (France); I. Seguy, J. Navarro, P. Destruel, Univ. Paul Sabatier (France)

SESSION 8 DISPLAY SUBSTRATES FABRICATION PROCESS

- 6911 OP **Excimer laser projection photoablation and lift-off process for patterning of indium-tin-oxide for cost-effective fabrication of flat-panel displays (Invited Paper)** [6911-27]
J. Chae, Univ. of Illinois at Urbana-Champaign (USA); S. Appasami, Anvik Corp. (USA); K. Jain, Univ. of Illinois at Urbana-Champaign (USA)

SESSION 9 NOVEL TECHNOLOGY FOR PROJECTION DISPLAYS

- 6911 OR **Establish a six-primary color display without pixel-distortion and brightness loss** [6911-29]
Y.-F. Hsieh, National Central Univ. (Taiwan); M.-C. Chuang, National Chiao-Tung Univ. (Taiwan); M. Ou-Yang, S.-W. Huang, J. Li, National Central Univ. (Taiwan); Y.-T. Kuo, National Chiao-Tung Univ. (Taiwan)

SESSION 10 ADVANCED LIGHT SOURCE, LASER PROJECTION TECHNOLOGY, AND THE RELATED

- 6911 OS **Increased collection efficiency of LIFI high intensity electrodeless light source** [6911-30]
A. Hafidi, M. DeVincentis, M. Duelli, R. Gilliard, Luxim Corp. (USA)
- 6911 OT **Effective speckle reduction in laser projection displays** [6911-31]
A. Furukawa, N. Ohse, Y. Sato, D. Imanishi, K. Wakabayashi, S. Ito, K. Tamamura, S. Hirata, Sony Corp. (Japan)
- 6911 OU **Recent advancements in system design for miniaturized MEMS-based laser projectors** [6911-32]
M. Scholles, K. Frommhagen, Ch. Gerwig, J. Knobbe, H. Lakner, D. Schlebusch, M. Schwarzenberg, U. Vogel, Fraunhofer Institute for Photonic Microsystems (Germany)

SESSION 11 3D PROJECTION DISPLAYS

- 6911 OV **Full-color interactive holographic projection system for large 3D scene reconstruction** [6911-33]
N. Leister, A. Schwerdtner, G. Fütterer, S. Buschbeck, J.-C. Olaya, S. Flon, SeeReal Technologies GmbH (Germany)

- 6911 OY **New markets and new light-sources for projection (Invited Paper)** [6911-36]
H. Moench, Philips Research Labs. (Germany)
- 6911 OZ **LED light source for projection displays (Invited Paper)** [6911-37]
G. Ouyang, K. Li, Wavien, Inc. (USA)

Author Index

Conference Committee

Symposium Chair

Ali Adibi, Georgia Institute of Technology (USA)

Symposium Cochair

James G. Grote, Air Force Research Laboratory (USA)

Program Track Chair

Liang-Chy Chien, Kent State University (USA)

Conference Chair

Liang-Chy Chien, Kent State University (USA)

Program Committee

Dick J. Broer, Technische Universiteit Eindhoven (Netherlands)
Vladimir G. Chigrinov, Hong Kong University Science and Technology
(Hong Kong China)
Harry J. Coles, University of Cambridge (United Kingdom)
Gregory P. Crawford, Brown University (USA)
Andy Y.-G. Fuh, National Cheng Kung University (Taiwan)
Wolfgang Haase, Technische Universität Darmstadt (Germany)
Jun-ichi Hanna, Tokyo Institute of Technology (Japan)
Heinz-Siegfried R. Kitzerow, Universität Paderborn (Germany)
Shunsuke Kobayashi, Tokyo University of Science (Japan)
Seung Hee Lee, Chonbuk National University (South Korea)
Akihiro Mochizuki, Nano Loa, Inc. (USA)
Kristiaan Neyts, Universiteit Gent (Belgium)
Ci-Ling Pan, National Chiao Tung University (Taiwan)
Richard L. Sutherland, Science Applications International Corporation
(USA)
Shin-Tson Wu, College of Optics and Photonics, University of Central
Florida (USA)

Session Chairs

- 1 Liquid Crystal Displays
Liang-Chy Chien, Kent State University (USA)
- 2 Electro-optical and Photonic Materials
Dick J. Broer, Technische Universiteit Eindhoven (Netherlands)

- 3 Actuators, Micropumps, and Robots
 Slobodan Žumer, University of Ljubljani (Slovenia)
- 4 Lasing, Tweezing, and Nanoparticle Assemblies
 Ru-Pin Pan, National Chiao Tung University (Taiwan)
- 5 THz Filters and Fresnel Lenses
 Antal I. Jakli, Kent State University (USA)
- 6 Polymer/Liquid Crystal Composites
 Andy Y.-G. Fuh, National Cheng Kung University (Taiwan)
- 7 Organic Solar Cells
 Robin L. B. Selinger, Kent State University (USA)
- 8 Display Substrates Fabrication Process
 Robin L. B. Selinger, Kent State University (USA)
- 9 Novel Technology for Projection Displays
 Ming H. Wu, Hamamatsu Corporation (USA)
- 10 Advanced Light Source, Laser Projection Technology, and the Related
 Ming H. Wu, Hamamatsu Corporation (USA)
- 11 3D Projection Displays
 Ming H. Wu, Hamamatsu Corporation (USA)