PROCEEDINGS OF SPIE

Liquid Crystals XVIII

lam Choon Khoo *Editor*

17–20 August 2014 San Diego, California, United States

Sponsored and Published by SPIE

Volume 9182

Proceedings of SPIE 0277-786X, V. 9182

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

Liquid Crystals XVIII, edited by Iam Choon Khoo, Proc. of SPIE Vol. 9182, 918201 © 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2176710

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 *Liquid Crystals XVIII*, edited by Iam Choon Khoo, Proceedings of SPIE Vol. 9182 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X ISBN: 9781628412093

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.ora

Copyright © 2014, 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/14/\$18.00.

Printed in the United States of America.

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



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 as 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

	Authors
ix	Conference Committee
xi	Direct electronic probing of biological complexes formation (Organic Photonics + Electronics Plenary Paper [9183-402])
xxi	Real-time holographic display using doped liquid crystals (Invited Paper Summary [9182-34])
SESSION 1	LC PHOTONICS
9182 03	Vertical-cavity surface-emitting laser with liquid crystal external cavity [9182-2]
9182 04	Light-induced effects in dye-doped liquid crystals: role of space charges (Invited Paper) [9182-3]
9182 06	Synthesis, liquid-crystalline behavior, and photoluminescence properties of novel Au(I) complex with naphthalene ring in a mesogenic core (Invited Paper) [9182-5]
SESSION 2	NOVEL LC MATERIALS AND PHOTONICS
9182 07	Light-emitting liquid-crystal displays constructed from AIE luminogens (Keynote Paper) [9182-6]
9182 07 9182 08	
	[9182-6]
9182 08	[9182-6] Fast algorithms for liquid crystal modelling (Invited Paper) [9182-7] Molecular dynamics in azobenzene liquid crystal polymer films studied by transient grating
9182 08 9182 09	[9182-6] Fast algorithms for liquid crystal modelling (Invited Paper) [9182-7] Molecular dynamics in azobenzene liquid crystal polymer films studied by transient grating technique (Invited Paper) [9182-8] Mechanoresponsive change in photoluminescent color of rod-like liquid-crystalline compounds and control of molecular orientation on photoaligned layer (Invited Paper)
9182 08 9182 09 9182 0A	[9182-6] Fast algorithms for liquid crystal modelling (Invited Paper) [9182-7] Molecular dynamics in azobenzene liquid crystal polymer films studied by transient grating technique (Invited Paper) [9182-8] Mechanoresponsive change in photoluminescent color of rod-like liquid-crystalline compounds and control of molecular orientation on photoaligned layer (Invited Paper) [9182-9]

SESSION 4	NOVEL LC MATERIALS I
9182 01	Ultrahigh sensitivity in liquid-crystal-based immunodetection by surface modification of the alignment layer (Invited Paper) [9182-16]
9182 OJ	Contact-angle measurements as a means of probing the surface alignment characteristics of liquid crystal materials on photoalignment layers (Invited Paper) [9182-17]
9182 OL	Investigation of host liquid crystal composition on polymer stabilised blue phase properties (Invited Paper) $[9182-19]$
SESSION 5	NOVEL LC MATERIALS II
9182 OP	Electrooptics of chiral nematics formed by molecular dimers (Invited Paper) [9182-24]
9182 0Q	New twist on the helical nanofilament phase of bent-core liquid crystals (Invited Paper) [9182-25]
9182 OR	Tailored liquid crystal devices for specific imaging applications (Invited Paper) [9182-26]
9182 0\$	Infrared reflector based on liquid crystal polymers and its impact on thermal comfort conditions in buildings $[9182\text{-}27]$
SESSION 6	SWITCHES, FILTERS, CONTROL, DISPLAY
9182 OU	Transient responses of liquid crystals for optical switching with microseconds: nanoseconds response speed [9182-29]
9182 0W	Liquid crystal claddings for passive temperature stabilization of silicon photonics [9182-31]
SESSION 7	LASER, DISPLAY, AND TUNABLE OPTICS
9182 OY	Lasing and waveguiding in smectic A liquid crystal optical fibers (Keynote Paper) [9182-33]
SESSION 8	PHOTOVOLTAIC AND NOVEL LC
9182 14	Photoinduced deformation of liquid crystal polymers (Invited Paper) [9182-39]
	POSTER SESSION
9182 18	Photonic density of states of a stack of cholesteric liquid crystals and isotropic medium layers [9182-44]

9182 19	Dependence of the electrooptical properties of polymer-dispersed vertical aligned liquid crystals on the surface affinity of the liquid crystal and monomer [9182-45]
9182 1A	Effect of UV curing conditions on polymerized tunable chiral nematic liquid crystals [9182-46]
9182 1B	On a photonic density of states of cholesteric liquid crystal cells [9182-47]
9182 1G	Fast response wavelength tunable filter using Vertically-Aligned Polymer-Stabilized Liquid Crystals (VA-PSLC) with a curing voltage [9182-52]

Proc. of SPIE Vol. 9182 918201-6

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abdulhalim, I., OR Abuleil, M., OR Bahr, Christian, 0Y

Bastiaansen, Cees W. M., OS Beeckman, Jeroen, 03, 1A Bennett, Thomas P., 08 Broer, Dick J., 0S Čančula, Miha, 0C Chang, Chia-Ming, 0B Chen, Chaoping, xxi Chen, Hung-Shan, OB Cheng, Futao, 14 Chilingaryan, Yu. S., 18, 1B Choi, Wing-Kit, 1G Čopar, Simon, OC

D'Alessandro, Giampaolo, 08

Daly, Keith R., 08 Debije, Michael G., 0\$ De Matteis, Giovanni, 08 Didovets, O., 0J Fainman, Yeshaiahu, 0W Fujii, Tomomi, 09 Fukae, Ryohei, 0A Gevorgyan, A. H., 18, 1B Giordano, Francesco, xi Hashimoto, Mayuko, 0A Hensen, Jan L. M., OS Herminghaus, Stephan, OY

Hong, K. L., 0U Ikeda, Tomiki, 09 Imrie, Corrie T., 0P Isaac, S., OR Jákli, A., 0Q Jampani, V.S.R., 0Y Katayama, Kenji, 09 Kawatsuki, Nobuhiro, 0A Khandelwal, Hitesh, OS Khoo, lam-Choon, 0U, 0W Kimura, Munehiro, OL Kirzhner, M. G., 0R Klapp, I., OR

Kocharian, A. N., 18, 1B Kondo, Mizuho, 0A Kuwahara, Shota, 09 Lavrentovich, Oleg D., OP, OQ

Lee, Hyojin, 19 Lee, Ji-Hoon, 19

Lee, Mon-Juan, Ol Lee, Wei, 0l

Leung, Chris Wai Tung, 07

Li, Quan, OP Li, Yan, xxi Li, Yan-Min, 1G Li, Yannian, OP Li, Xiao, xxi Lin, Yi-Hsin, OB Liu, Yuyun, 14

Lucchetti, L., 04

Loonen, Roel C. G. M., 0S

Lv, Jiu-an, 14 Macchia, Eleonora, xi Magliulo, Maria, xi Manoli, Kyriaki, xi Marshall, K. L., OJ Miura, Seiya, 0A

Mohammadimasoudi, Mohammad, 1A

Mohd Said, Suhana, OL Murugesan, Yogesh, 08 Muševič, Igor, 0Y Neyts, Kristiaan, 03, 1A Oganesyan, K. B., 18, 1B Okumoto, Kentaro, 0A Palazzo, Gerardo, xi Panajotov, K., 03 Peddireddy, Karthik, OY Ptasinski, Joanna N., 0W

Qin, Anjun, 07

Rahman, Md Asiqur, 0L Ravnik, Miha, 0C Roberz, Franziska, OS Rokusha, Yuki, 06 Rostovtsev, Y. V., 18, 1B Safrani, A., OR Santrosyan, E. A., 18, 1B

Simoni, F., 04

Saulnier, D., 0J

Schenning, Albert P. H. J., 0S Shiyanovskii, Sergij V., OP

Solodar, A., OR Su, Hui-Wen, Ol Su, Yikai, xxi Sugimoto, Nana, 06 Sun, Shih-Hung, Ol Takado, Kiyohide, 09 Tang, Ben Zhong, 07 Torsi, Luisa, xi Tsutsumi, Osamu, 06 Vardanyan, G. A., 18, 1B Vitek, Maruša, 0Y Wang, Yu-Jen, 0B Xiang, Jie, 0P Xie, Y., 03 Yamada, Shigeyuki, 06 Yamana, Itaru, 0L Yoon, Tae-Hoon, 19 Yu, Yanlei, 14 Zhang, C., 0Q Zhao, Dongyu, 07 Zhao, S., 0U Žumer, Slobodan, 0C

Conference Committee

Symposium Chair

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

Conference Chair

Iam Choon Khoo, The Pennsylvania State University (United States)

Conference Program Committee

Timothy J. Bunning, Air Force Research Laboratory (United States)
Shaw-Horng Chen, University of Rochester (United States)
Neil Collings, University of Cambridge (United Kingdom)
Jean-Pierre Huignard, Jphopto (France)
Tomiki Ikeda, Chuo University (Japan)
Oleg D. Lavrentovich, Kent State University (United States)
Francesco Simoni, Università Politecnica delle Marche (Italy)
David M. Walba, University of Colorado at Boulder (United States)

Session Chairs

- 1 LC Photonics Iam Choon Khoo, The Pennsylvania State University (United States)
- 2 Novel LC Materials and Photonics Timothy J. White, Air Force Research Laboratory (United States)
- 3 Photonics and Complex Phenomena
 Oleg D. Lavrentovich, Kent State University (United States)
- 4 Novel LC Materials I **David M. Walba**, University of Colorado at Boulder (United States)
- Novel LC Materials II
 Kenneth L. Marshall, University of Rochester (United States)
- 6 Switches, Filters, Control, Display
 Francesco Simoni, Università Politecnica delle Marche (Italy)

- Laser, Display, and Tunable Optics
 Kenneth L. Marshall, University of Rochester (United States)
- 8 Photovoltaic and Novel LC lam Choon Khoo, The Pennsylvania State University (United States)