PROCEEDINGS OF SPIE

Emerging Liquid Crystal Technologies XIX

Liang-Chy Chien Nelson V. Tabiryan Jun Yamamoto Editors

30–31 January 2024 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 12907

Proceedings of SPIE 0277-786X, V. 12907

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

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings: Author(s), "Title of Paper," in *Emerging Liquid Crystal Technologies XIX*, edited by Liang-Chy Chien, Nelson V. Tabiryan, Jun Yamamoto, Proc. of SPIE 12907, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X ISSN: 1996-756X (electronic)

ISBN: 9781510670747 ISBN: 9781510670754 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2024 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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



Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

• The first five 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.

Contents

v Conference Committee

CHIRAL PHASES AND DEVICE APPLICATIONS

12907 02 Cholesteric spherical reflectors as innovative optical elements with vast application potential (Invited Paper) [12907-2]

SOFT ROBOTICS, SENSORS, AND ACTUATORS

- 12907 03 Synthesis of low-order liquid-crystalline viologens and their photo-responsive behavior (Invited Paper) [12907-5]
- 12907 04 Liquid crystal elastomer soft robotic arm for pick-and-place operation controlled by light (Invited Paper) [12907-6]

TOPOLOGY, MICROFLUIDICS, AND APPLICATIONS

12907 05 Advanced self-assembly control of rod-shaped organic semiconductors (Invited Paper) [12907-31]

LASING, WAVEGUIDES, NLO, AND FLAT OPTICS I

12907 06 Easy manufacture large aperture wide range variafocal liquid crystal diffractive lens (Invited Paper) [12907-17]

POLYMER AND LC COMPOSITES

12907 07 Three-dimensionally printed microwell for observing single liquid crystalline shell (Invited Paper) [12907-20]

AR/VR/MR DISPLAYS

12907 08 Achromatic diffractive liquid-crystal optics for VR displays [12907-25]

12907 09 A tunable transmissive Pancharatnam phase device with high optical beam steering efficiency (Invited Paper) [12907-45]

POLARIZERS, OPTICAL RETARDERS, AND THZ FILTERS

- 12907 0A Improvement of THz phase sensing system by using LC phase shifter under magnetic field application (Invited Paper) [12907-32]
- 12907 OB Pixelated photonic crystals for THz applications (Invited Paper) [12907-33]
- 12907 OC Liquid crystal-based programmable metasurface for terahertz beam manipulation [12907-34]

GRATINGS, DISPLAYS, AND PHOTOVOLTAICS

- 12907 0D An orthogonal coupling between liquid crystal layer polarization and externally applied electric field by an SSD liquid crystal [12907-36]
- 12907 OE Angular-insensitive birefringent optical filters using liquid crystal materials [12907-37]

POSTER SESSION

12907 OF Large laser written liquid crystal devices for spherical aberration correction [12907-40]