

PROCEEDINGS OF SPIE

Active Photonic Platforms (APP) 2024

**Ganapathi S. Subramania
Stavroula Foteinopoulou**
Editors

**18–22 August 2024
San Diego, California, United States**

Sponsored and Published by
SPIE

Volume 13110

Proceedings of SPIE 0277-786X, V. 13110

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

Active Photonic Platforms (APP) 2024, edited by Ganapathi S. Subramania,
Stavroula Foteinopoulou, Proc. of SPIE Vol. 13110, 1311001
© 2024 SPIE · 0277-786X · doi: 10.1117/12.3052836

Proc. of SPIE Vol. 13110 1311001-1

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 SPIDigitalLibrary.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 *Active Photonic Platforms (APP) 2024*, edited by Ganapathi S. Subramania, Stavroula Foteinopoulou, Proc. of SPIE 13110, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510678804
ISBN: 9781510678811 (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.

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

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

vii *Conference Committee*

LIGHT IN 4D I

13110 02 **Dynamics of optical vortices in Van der Waals materials (Invited Paper)** [13110-11]

LIGHT IN 4D II

13110 03 **Parametrically resonant plasmonic structures: theory and applications (Invited Paper)** [13110-19]

FRONTIERS IN POLARITONS I: CAVITY EFFECTS AND STRONG COUPLING

13110 04 **Realizing molecular optomechanics induced hybrid properties in soft materials filled plasmonic nanocavities** [13110-22]

FRONTIERS IN POLARITONS II: LOW-DIMENSIONAL SYSTEMS

13110 05 **Comparing exciton-polariton couplings in two-dimensional MoS₂ cavities** [13110-25]

NOVEL NON-LINEAR PHOTONIC PHENOMENA AND SYSTEMS

13110 06 **Ultrashort pulse control at the epsilon-near-zero spectral point in multilayered transparent conductive oxides metamaterials (Invited Paper)** [13110-34]

13110 07 **Bragg soliton dynamics on an ultra-silicon-rich nitride chip (Invited Paper)** [13110-38]

TOPOLOGY AND SYMMETRY IN PHOTONICS

13110 08 **Unidirectionally coupled microcavities: intuitive and robust construction of high-order exceptional points** [13110-40]

NEW OPTOMECHANICAL PHENOMENA AND SYSTEMS

13110 09 **Sensitive infrared detection via optomechanical spring sensing** [13110-53]

INTEGRATED PHOTONICS: NEW PARADIGM SYSTEMS AND FABRICATION APPROACHES

- 13110 0A **Heterogeneous integration of active photonic materials leveraging substrate-inverted multimaterial integration technology (SuMMIT) (Keynote Paper)** [13110-57]

NOVEL ARCHITECTURES AND DEVICES FOR PHOTONIC-BASED COMPUTING

- 13110 0B **Computing on the verge of chaos: classical and quantum reservoirs** [13110-47]
- 13110 0C **Image sensitive spectral response of semiconductor random network lasers** [13110-6]

RECONFIGURABLE SYSTEMS BASED ON PHASE-CHANGE MATERIALS

- 13110 0D **Electrical switch of phase change materials: toward the control of crystallinity for multilevel reconfigurable nanophotonics** [13110-73]
- 13110 0E **Switchable absorbers and multicolor pixels based on phase-change materials (Invited Paper)** [13110-77]

NEW SYSTEMS FOR ABSORPTION AND EMISSION CONTROL AND THEIR APPLICATIONS

- 13110 0F **Mid-infrared absorption, emission, and nonlinear response in extreme sub-wavelength films (Keynote Paper)** [13110-63]
- 13110 0G **A compact numerical model for photodetectors made from two-dimensional materials** [13110-64]
- 13110 0H **Polarization-selective photodetector based on topological insulators for secure optical communications and sensing applications** [13110-83]

NEW CONCEPTS AND APPROACHES FOR ACTIVE DEVICES

- 13110 0I **Sub-threshold optoelectronic oscillator for selective amplification of RF signals** [13110-84]
- 13110 0J **Metal-nanogap-metal strain, temperature, and infrared sensors** [13110-85]

POSTER SESSION

- 13110 OK **Bifurcations and exceptional point boundaries in time-delay coupled opto-electronic oscillators** [13110-87]
- 13110 OL **Photosynthesis in dinoflagellates assisted by nanoparticles and their implications on cell density and metabolite production** [13110-97]
- 13110 OM **Multilayer structures based on phase-change materials for reconfigurable structural color generation** [13110-98]

Conference Committee

Symposium Chairs

Sonja Franke-Arnold, University of Glasgow (United Kingdom)
Giovanni Volpe, Göteborgs University (Sweden)

Symposium Co-chairs

Cornelia Denz, Physikalisch-Technische Bundesanstalt (Germany)
Gennady Shvets, Cornell University (United States)

Conference Chairs

Ganapathi S. Subramania, Sandia National Labs. (United States)
Stavroula Foteinopoulou, The University of New Mexico (United States)

Conference Program Committee

Andrea Alù, The City University of New York (United States)
Koray Aydin, Northwestern University (United States)
Harish Bhaskaran, University of Oxford (United Kingdom)
Paul V. Braun, University of Illinois (United States)
Che Ting Chan, Hong Kong University of Science and Technology
(Hong Kong, China)
Zhigang Chen, San Francisco State University (United States) and
Nankai University (China)
Dmitry N. Chigrin, DWI an der RWTH Aachen e.V. (Germany)
Shanhui Fan, Stanford University (United States)
Didier Felbacq, Université Montpellier (France)
Juejun Hu, Massachusetts Institute of Technology (United States)
Stephen Hughes, Queen's University (Canada)
Boubacar Kante, University of California, Berkeley (United States)
Mercedeh Khajavikhan, The University of Southern California
(United States)
Alexander V. Kildishev, Purdue University (United States)
Nathaniel Kinsey, Virginia Commonwealth University (United States)
Yuri S. Kivshar, The Australian National University (Australia)
A. Femius Koenderink, AMOLF (Netherlands)
Aude L. Lereu, Institut Fresnel (France)
Cefe López, Consejo Superior de Investigaciones Científicas (Spain)
Liam O'Faolain, Munster Technological University (Ireland) and Tyndall
National Institute (Ireland)
Rupert F. Oulton, Imperial College London (United Kingdom)

Nicolae-Coriolan Panoiu, University College London
(United Kingdom)
Ruwen Peng, Nanjing University (China)
Michelle L. Povinelli, The University of Southern California
(United States)
Subramaniam Anantha Ramakrishna, Indian Institute of Technology
Kanpur (India)
Christophe Sauvan, Université Paris-Saclay (France) and CNRS
(France)
Jörg Schilling, Martin-Luther-Univ. Halle-Wittenberg (Germany)
Gennady B. Shvets, Cornell University (United States)
Volker J. Sorger, University of Florida (United States)
Isabelle Staude, Friedrich-Schiller-Univ. Jena (Germany)
Andrey A. Sukhorukov, The Australian National University (Australia)
Georgios Veronis, Louisiana State University (United States)
Daniel M. Wasserman, The University of Texas at Austin (United States)
Sharon M. Weiss, Vanderbilt University (United States)