PROCEEDINGS OF SPIE

Photonic and Phononic Properties of Engineered Nanostructures XIII

Ali Adibi Shawn-Yu Lin Axel Scherer Editors

30 January – 2 February 2023 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 12431

Proceedings of SPIE 0277-786X, V. 12431

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

Photonic and Phononic Properties of Engineered Nanostructures XIII, edited by Ali Adibi, Shawn-Yu Lin, Axel Scherer, Proc. of SPIE Vol. 12431, 1243101 © 2023 SPIE · 0277-786X · doi: 10.1117/12.2675513

Proc. of SPIE Vol. 12431 1243101-1

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 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 Photonic and Phononic Properties of Engineered Nanostructures XIII, edited by Ali Adibi, Shawn-Yu Lin, Axel Scherer, Proc. of SPIE 12431, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510659674 ISBN: 9781510659681 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2023 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

vii Conference Committee

NOVEL MATERIALS AND PHENOMENA IN ENGINEERED NANOSTRUCTURES

12431 02 Vibration localization in elastic hyperbolic lattices (Invited Paper) [12431-5]

NANOPHOTONIC STRUCTURES FOR SENSING AND SPECTROSCOPY

- 12431 03 Combined Brillouin and Raman scattering spectroscopy in 2PP printed structures [12431-11]
- 12431 04 Integrated optical sensing system on glass substrate [12431-12]

PHOTONIC CRYSTAL STRUCTURES

- 12431 05 Creating structured space-time light with nanophotonics (Invited Paper) [12431-13]
- 12431 06 H1 hexapole photonic crystal nanocavities with theoretical and measured quality factors exceeding 10⁸ and 10⁶ [12431-14]

QUANTUM NANOSTRUCTURES

12431 07 Quantum meta-photonics (Invited Paper) [12431-18]

METAPHOTONIC STRUCTURES: MATERIALS AND DEVICES I

12431 08 Overcoming intensity saturation in second harmonic nonlinear intersubband polaritonic metasurfaces using two-level systems [12431-23]

METAPHOTONIC STRUCTURES: MATERIALS AND DEVICES II

12431 09 High transmission efficiency colour filters based on hybrid metal-dielectric metasurfaces [12431-27]

DYNAMICALLY RECONFIGURABLE METAPHOTONIC DEVICES

12431 0A Functionalisation of 20 nm citrate-coated gold nanoparticles using perfluorodecanethiol [12431-34]

RECONFIGURABLE NANOPHOTONICS USING PHASE-CHANGE MATERIALS

12431 OB Learning from failure: boosting cycling endurance of optical phase change materials (Invited Paper) [12431-36]

NANOPHOTONIC DESIGN APPROACHES BASED ON ARTIFICIAL INTELLIGENCE

12431 0C Inverse design of two-dimensional freeform metagrating using an adversarial conditional variational autoencoder [12431-41]

MODELING, SIMULATION, AND DESIGN OF NANOPHOTONIC STRUCTURES

12431 0D Engineering band-edge dynamics of photonic filters via topology optimization [12431-47]

RESONANCE-BASED NANOPHOTONIC DEVICES

12431 OE Enhancing nonlinear performance of resonant cavities using nonlinear organic monolayers (Invited Paper) [12431-49]

NONLINEAR PHOTONIC NANOSTRUCTURES II

12431 OF Controlling the magnetic response in dielectrics via near-field interactions [12431-59]

POSTER SESSION

- Polarization-independent VO₂ metagrating for broadband optical transmittance modulation [12431-61]
 Enhanced light emission collection from InGaN guantum wells using plasmonic metasurfaces
- 12431 OHEnhanced light emission collection from InGaN quantum wells using plasmonic metasurfaces[12431-63]

12431 01 Photonic-crystal surface-emitting lasers in red wavelength range [12431-17]

Conference Committee

Symposium Chairs

Sonia M. García-Blanco, Universiteit Twente (Netherlands) Bernd Witzigmann, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)

Symposium Co-chairs

Ulrich T. Schwarz, Technische Universität Chemnitz (Germany) Karin Hinzer, University of Ottawa (Canada)

Program Track Chair

Ali Adibi, Georgia Institute of Technology (United States)

Conference Chairs

Ali Adibi, Georgia Institute of Technology (United States) Shawn-Yu Lin, Rensselaer Polytechnic Institute (United States) Axel Scherer, California Institute of Technology (United States)

Conference Program Committee

Andrea Alù, The City University of New York Advanced Science Research Center (United States) Amir Arbabi, University of Massachusetts, Amherst (United States) Ali A. Eftekhar, Intel Corporation (United States) Mercedeh Khajavikhan, The University of Southern California (United States) **Reginald K. Lee**, California Institute of Technology (United States) Marko Loncar, Harvard John A. Paulson School of Engineering and Applied Sciences (United States) Arka Majumdar, University of Washington (United States) Susumu Noda, Kyoto University (Japan) Masaya Notomi, NTT Basic Research Laboratories (Japan) **Ekmel Özbay**, Bilkent Üniversitesi (Turkey) Yong Xu, Virginia Polytechnic Institute and State University (United States) Eli Yablonovitch, University of California, Berkeley (United States) **Rashid Zia**, Brown University (United States)