PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 9757

, "Front Matter: Volume 9757," Proc. SPIE 9757, High Contrast
Metastructures V, 975701 (17 August 2016); doi: 10.1117/12.2240403

SPIE.

Event: SPIE OPTO, 2016, San Francisco, California, United States

PROCEEDINGS OF SPIE

High Contrast Metastructures V

Connie J. Chang-Hasnain
David Fattal
Fumio Koyama
Weimin Zhou
Editors

17–18 February 2016
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 9757

Proceedings of SPIE 0277-786X, V. 9757

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

High Contrast Metastructures V, edited by Connie J. Chang-Hasnain, David Fattal,
Fumio Koyama, Weimin Zhou, Proc. of SPIE Vol. 9757, 975701 · © 2016 SPIE
CCC code: 0277-786X/16/\$18 · doi: 10.1117/12.2240403

Proc. of SPIE Vol. 9757 975701-1

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 *High Contrast Metasurfaces V*, edited by Connie J. Chang-Hasnain, David Fattal, Fumio Koyama, Weimin Zhou, Proceedings of SPIE Vol. 9757 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781628419924

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 © 2016, 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/16/\$18.00.

Printed in the United States of America.

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

**SPIE. DIGITAL
LIBRARY**
SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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 six-digit CID article numbering system structured as follows:

- 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.

Contents

- v *Authors*
- vii *Conference Committee*

SESSION 1	HARNESSING LIGHT I
9757 03	Widened photonic functionality of asymmetric high-index contrast/photonic crystal gratings (Invited Paper) [9757-2]
SESSION 2	HARNESSING LIGHT II
9757 05	Guided-mode resonance nanophotonics in materially sparse architectures (Invited Paper) [9757-4]
9757 08	High-efficiency aperiodic two-dimensional high-contrast-grating hologram [9757-7]
SESSION 3	VCSELS
9757 0A	Hybrid III-V on Si grating as a broadband reflector and a high-Q resonator (Invited Paper) [9757-9]
9757 0C	Two-dimensional designed fabrication of subwavelength grating HCG mirror on silicon-on-insulator [9757-11]
SESSION 4	VCSELS AND SLOW LIGHT
9757 0D	Multi-parameter optimization of monolithic high-index contrast grating reflectors (Invited Paper) [9757-12]
9757 0G	Active tunable high contrast meta-structure Si waveguide [9757-15]
9757 0H	Slow light effect via Rayleigh anomaly in high contrast gratings [9757-31]
SESSION 5	METASURFACES
9757 0M	Planar lens with a quasi-periodic circular design [9757-20]

SESSION 6 RESONATORS AND PLASMONICS

9757 0Q **Integrated plasmonic refractive index sensor based on grating/metal film resonant structure** [9757-24]

SESSION 7 OPTOMECHANICS AND PHASED ARRAYS

9757 0T **Cavity optomechanics with 2D photonic crystal membrane reflectors** [9757-27]

9757 0U **Progress and prospects of silicon-based design for optical phased array (Invited Paper)** [9757-28]

SESSION 8 NOVEL DEVICES

9757 0W **Photonic-crystal slab for terahertz-wave technology platform (Invited Paper)** [9757-30]

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.

Anderson, Stephen, 0G
Chang-Hasnain, Connie J., 08, 0M, 0Q, 0U
Chong, Xinyuan, 0H
Chung, Il-Sug, 0A
Czyszanowski, Tomasz, 0D
Dems, Maciej, 0D
Dubois, Florian, 03
Fujita, Masayuki, 0W
Gebiski, Marcin, 0D
He, Sailing, 0C
Hong, Kuo-Bin, 0C
Hu, Weiwei, 0U
Huang, Shen-Che, 0C
Huang, Yidong, 0Q
Huang, Zhaoran R., 0G
Jiang, Lingjun, 0G
Kim, Kyoung-Youm, 0H
Ko, Yeong Hwan, 05
Lawall, John, 0T
Leclercq, Jean-Louis, 03
Lee, Kyu Jin, 05
Letartre, Xavier, 03
Lingaraju, Navin B., 0T
Liu, Fang, 0Q
Liu, Youhai, 0Q
Lu, Tien-Chang, 0C
Magnusson, Robert, 05
Marciniak, Magdalena, 0D
Nguyen, Hai Son, 03
Niraula, Manoj, 05
Park, Gyeong Cheol, 0A
Peng, Chao, 0U
Phan, Thaibao Q., 0M
Qiao, Pengfei, 08, 0M
Seassal, Christian, 03
Shuai, Yichen, 0T
Sun, Mingze, 0Q
Sun, Tianbo, 0Q
Taghizadeh, Alireza, 0A
Taleb, Hussein, 0G
Viktorovitch, Pierre, 03
Wang, Alan X., 0H
Wasiak, Michał, 0D
Yoon, Jae Woong, 05
Zhou, Weimin, 0G
Zhu, Li, 08, 0M, 0Q

Conference Committee

Symposium Chairs

Jean-Emmanuel Broquin, IMEP-LAHC (France)
Shibin Jiang, AdValue Photonics, Inc. (United States)

Symposium Co-chairs

David L. Andrews, University of East Anglia (United Kingdom)
Alexei L. Glebov, OptiGrate Corporation (United States)

Program Track Chair

Ali Adibi, Georgia Institute of Technology (United States)

Conference Chairs

Connie J. Chang-Hasnain, University of California, Berkeley
(United States)
David Fattal, LEIA Inc. (United States)
Fumio Koyama, Tokyo Institute of Technology (Japan)
Weimin Zhou, U.S. Army Research Laboratory (United States)

Conference Program Committee

Markus-Christian Amann, Walter Schottky Institut (Germany)
Il-Sug Chung, Technical University of Denmark (Denmark)
Ernst-Bernhard Kley, Friedrich-Schiller-Universität Jena (Germany)
Philippe Lalanne, Institut d'Optique Graduate School (France)
John R. Lawall, National Institute of Standards and Technology
(United States)
Tien-Chang Lu, National Chiao Tung University (Taiwan)
Rainer F. Mahrt, IBM Research – Zürich (Switzerland)
Gunther Roelkens, Universiteit Gent (Belgium)
Pierre Viktorovitch, Ecole Centrale de Lyon (France)
Alan E. Willner, University of Southern California (United States)
Ming C. Wu, University of California, Berkeley (United States)
Anshi Xu, Peking University (China)

Session Chairs

- 1 Harnessing Light I
 Weimin Zhou, U.S. Army Research Laboratory (United States)
- 2 Harnessing Light II
 Siyuan Yu, University of Bristol (United Kingdom)
- 3 VCSELs
 Tien-Chang Lu, National Chiao Tung University (Taiwan)
- 4 VCSELs and Slow Light
 Andrei Faraon, California Institute of Technology (United States)
- 5 Metasurfaces
 Werner H. Hofmann, Technische Universität Berlin (Germany)
- 6 Resonators and Plasmonics
 John R. Lawall, National Institute of Standards and Technology
 (United States)
- 7 Optomechanics and Phased Arrays
 Hui Deng, University of Michigan (United States)
- 8 Novel Devices
 Arseniy I. Kuznetsov, A*STAR - Data Storage Institute (Singapore)