PROCEEDINGS OF SPIE

Quantum Nanophotonics

Jennifer A. Dionne Mark Lawrence Editors

7–8 August 2017 San Diego, California, United States

Sponsored and Published by SPIE

Volume 10359

Proceedings of SPIE 0277-786X, V. 10359

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

Quantum Nanophotonics, edited by Jennifer A. Dionne, Mark Lawrence, Proc. of SPIE Vol. 10359, 1035901 · © 2017 SPIE · CCC code: 0277-786X/17/\$18 · doi: 10.1117/12.2297044

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 *Quantum Nanophotonics*, edited by Jennifer A. Dionne, Mark Lawrence, Proceedings of SPIE Vol. 10359 (SPIE, Bellingham, WA, 2017) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510611757

ISBN: 9781510611764 (electronic)

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 © 2017, 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/17/\$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. 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 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 vii	Authors Conference Committee
	MANIPULATING AND MEASURING COMPLEX QUANTUM STATES
10359 08	Quantum localization issues in nonlinear frequency conversion and harmonic generation [10359-6]
	QUANTUM EMITTERS
10359 0A	Nanophotonic enhanced quantum emitters (Invited Paper) [10359-8]
	LOW-LOSS NANOPHOTONICS
10359 OH	Surface-wave phenomena and anisotropic photoluminescence in nano-film structures [10359-15]
	NANO-OPTOMECHANICS
10359 OK	Optomechanics with one-dimensional gallium phosphide photonic crystal cavities [10359-18]
	POSTER SESSION
10359 OS	How to detect Berry phase in graphene without magnetic field? [10359-26]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Achtstein, Alexander W., 0H Andrews, David L., 08 Apalkov, Vadym, OS Baumgartner, Yannick, OK Czornomaz, Lukas, 0K Di Falco, Andrea, 0A Forbes, Kayn A., 08 Ford, Jack S., 08 Franz, Philipp, 0H Gather, Malte, 0A Grosse, Nicolai B., 0H Hahn, Herwig, OK Heckmann, Jan, 0H Hönl, Simon, OK Koochaki Kerlardeh, Hamed, OS Li, Xin, 0A Pufahl, Karsten, 0H Schneider, Katharina, OK Scott, Riccardo, OH Seidler, Paul, OK Stockman, Mark I., 0S Welter, Pol, 0K Woggon, Ulrike, 0H Yu, Ying, 0A Zhou, Zhang-Kai, OA

Conference Committee

Symposium Chairs

 Harry A. Atwater Jr., California Institute of Technology (United States)
 Nikolay I. Zheludev, Optoelectronics Research Centre (United Kingdom) and Nanyang Technological University (Singapore)

Symposium Co-Chairs

James G. Grote, Air Force Research Laboratory (United States)

David L. Andrews, University of East Anglia (United Kingdom)

Conference Chairs

Jennifer A. Dionne, Stanford University (United States) **Mark Lawrence**, Stanford University (United States)

Conference Program Committee

Javier Aizpurua, Centro de Fisica de Materiales (Spain)

Andrea Di Falco, University of St. Andrews (United Kingdom)

Nader Engheta, University of Pennsylvania (United States)

Andrei Faraon, California Institute of Technology (United States)

Javier García de Abajo, ICFO - Institut de Ciències Fotòniques (Spain)

Mohammad Hafezi, Joint Quantum Institute (United States)

Zubin Jacob, Purdue University (United States)

Satoshi Kawata, Osaka University (Japan)

Marko Loncar, Harvard School of Engineering and Applied Sciences (United States)

Maiken H. Mikkelsen, Duke University (United States)

Sunil Mittal, Joint Quantum Institute (United States)

Prineha Narang, Harvard University (United States)

Jeremy L. O'Brien, University of Bristol (United Kingdom)

Teri W. Odom, Northwestern University (United States)

Vladimir M. Shalaev, Purdue University (United States)

Matthew T. Sheldon, Texas A&M University (United States)

Mark Tame, University of KwaZulu-Natal (South Africa)

Ewold Verhagen, FOM Institute for Atomic and Molecular Physics (Netherlands)

Ulrike Woggon, Technische Universität Berlin (Germany)

Session Chairs

- Asymmetric and Nonreciprocal Phenomena
 Javier Aizpurua, Centro de Fisica de Materiales (Spain)
- 2 Manipulating and Measuring Complex Quantum States Prineha Narang, Harvard University (United States)
- 3 Quantum EmittersDavid Barton, Stanford University (United States)
- 4 Low-Loss Nanophotonics Andrea Di Falco, University of St. Andrews (United Kingdom)
- Nano-OptomechanicsMark Lawrence, Stanford University (United States)
- 6 Quantum Plasmonics
 Hadiseh Alaeian, Northwestern University (United States)