PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

Front Matter: Volume 10682

, "Front Matter: Volume 10682," Proc. SPIE 10682, Semiconductor Lasers and Laser Dynamics VIII, 1068201 (20 July 2018); doi: 10.1117/12.2501732

SPIE.

Event: SPIE Photonics Europe, 2018, Strasbourg, France

PROCEEDINGS OF SPIE

Semiconductor Lasers and Laser Dynamics VIII

**Krassimir Panajotov
Marc Sciamanna
Rainer Michalzik**
Editors

**23–26 April 2018
Strasbourg, France**

Sponsored by
SPIE

Cosponsored by
Strasbourg the Eurooptimist (France)
CNRS (France)
Investissements d'Avenir (France)
iCube (France)
Université de Strasbourg (France)

Cooperating Organisations
Photonics 21 (Germany)
EOS—European Optical Society (Germany)
Photonics Public Private Partnership (Belgium)
Comité National d'Optique et de Photonique (France)

Published by
SPIE

Volume 10682

Proceedings of SPIE 0277-786X, V. 10682

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

Semiconductor Lasers and Laser Dynamics VIII, edited by Krassimir Panajotov, Marc Sciamanna, Rainer Michalzik,
Proc. of SPIE Vol. 10682, 1068201 · © 2018 SPIE · CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2501732

Proc. of SPIE Vol. 10682 1068201-1

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 *Semiconductor Lasers and Laser Dynamics VIII*, edited by Krassimir Panajotov, Marc Sciamanna, Rainer Michalzik, Proceedings of SPIE Vol. 10682 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510618909
ISBN: 9781510618916 (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 © 2018, 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/18/\$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**
SPIDigitalLibrary.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 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	<i>Authors</i>
ix	<i>Conference Committee</i>

VCSELS

10682 04	Optical wireless power transmission using VCSELS (Invited Paper) [10682-3]
10682 05	Spin lasers for optical data communication [10682-4]

QUANTUM DOT LASERS AND AMPLIFIERS

10682 0C	Non-Adler excitable interplay between lasing quantum dot states [10682-11]
----------	---

LASER NONLINEAR DYNAMICS I

10682 0H	Theory of delay-coupled nonidentical quantum cascade lasers [10682-16]
10682 0J	Thermal characterisation of quantum cascade lasers with Fabry Perot modes [10682-18]

MODE-LOCKED LASERS AND FREQUENCY COMBS

10682 0M	Monolithic symmetric multiple colliding pulse mode-locked laser by using on-chip reflectors [10682-21]
10682 0N	Mode-locked diode laser with resonant ring amplifier [10682-22]

NANOLASERS

10682 0O	Lasing from ZnO nanorods on ITO-coated substrates [10682-27]
10682 0Q	Threshold dynamics in meso- and nanoscale lasers: why Vertical Cavity Surface Emitting Lasers? (Invited Paper) [10682-29]

ON-SI INTEGRATION

- 10682 0U **Hybrid integration of GaInAsP LD on silicon platform by epitaxial growth using directly bonded InP/Si substrate (Invited Paper)** [10682-24]

LASER NONLINEAR DYNAMICS II

- 10682 0X **Active-MMI laser diode toward high-speed direct modulation based on multiple photon-photon resonance (Invited Paper)** [10682-32]
- 10682 0Y **Recent advances in InAs/GaAs quantum dot lasers with short optical feedback (Invited Paper)** [10682-33]
- 10682 0Z **Injection locking of two laterally-coupled semiconductor laser arrays** [10682-34]
- 10682 10 **Beyond the relaxation frequency limit in square-wave dynamics** [10682-35]

NOVEL CONCEPTS II

- 10682 14 **Optically quantum-well-pumped semiconductor disk lasers for single- and dual-wavelength emission** [10682-39]

PHOTONIC CRYSTAL LASERS/VCSELS

- 10682 18 **Optical manipulation of current confinement in VCSELS with an external laser beam (Best Student Paper Award)** [10682-43]
- 10682 19 **Thermally-induced birefringence in VCSELS: approaching the limits** [10682-44]

NOVEL CONCEPTS III

- 10682 1D **Theoretical study of polarization dynamics in VCSEL-based optical frequency combs** [10682-48]

SPATIOTEMPORAL AND FEEDBACK-INDUCED DYNAMICS

- 10682 1F **Spatiotemporal extreme events in spatially extended lasers (Invited Paper)** [10682-50]
- 10682 1I **Feedback-induced discretisation of the relaxation oscillation frequency in a semiconductor laser** [10682-53]

POSTER SESSION

- 10682 1K **Study of a single emitter laser diode: Pspice model and characterization system** [10682-55]
- 10682 1O **Temperature dependence of external differential quantum efficiency of GaN-based blue laser diode** [10682-59]
- 10682 1P **Design and characterization of a laser integrated with long on-chip optical feedback usable as compact random number generator** [10682-60]
- 10682 1Q **Suppressed time delay signature in chaotic nanolasers with hybrid feedback** [10682-61]
- 10682 1R **Equivalent circuit modeling of the dynamic operation of ultra-high speed multi-mode VCSELs** [10682-62]
- 10682 1S **IFVD-based large intermixing selectivity window process for high power laser diodes** [10682-63]
- 10682 1T **De-embedding device parasitics of ultra-high speed VCSELs** [10682-64]
- 10682 1U **Validation of quasi-normal modes and of constant-flux modes for computing fundamental resonances of VCSELs** [10682-65]
- 10682 1V **Modeling of a semiconductor laser coupled to an external fiberoptic ring resonator** [10682-66]
- 10682 1Y **Numerical modeling of mode-locking stability and repetition rate transitions in monolithic multi-section semiconductor lasers** [10682-69]
- 10682 1Z **Timing stability and repetition rate frequency tuning analysis of a passively mode-locked quantum-well semiconductor laser subject to dual-cavity optical self-feedback** [10682-70]
- 10682 22 **Optical feedback stabilization of a frequency comb generated by a self-mode-locked quantum dot laser emitting at 1255 nm** [10682-73]
- 10682 23 **RF line width and integrated RIN study of a single-section quantum dot comb laser** [10682-74]
- 10682 24 **Nonlinear characteristics of semiconductor laser subject to optical incoherent feedback** [10682-75]
- 10682 25 **Dynamical characteristics of semiconductor laser under both optical and optoelectronic feedback** [10682-76]
- 10682 26 **Theoretical study of mode-locked lasers with nonlinear loop mirrors** [10682-77]
- 10682 28 **Development of InP-based multichannel transmitters for application in WDM access systems** [10682-79]

- 10682 2B **Facet temperature reduction by separate pumped window in high power laser diodes**
[10682-82]
- 10682 2C **300mm focal length optical system design for direct high power laser diodes stack** [10682-83]
- 10682 2D **Frequency modulated external cavity laser with photonic crystal resonator and microheater**
[10682-84]

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.

Acedo, Pablo, 1D	Grillot, F., 0Y
Ackermann, Philipp, 14	Gündoğdu, Sinan, 0J, 2B
Adams, Michael, 0Z	Günoven, Mete, 0J
Adigun, Taofeek O., 1O	Guzmán, Robinson, 0M
Al-Basheer, Watheq, 1O	Haghighi, Nasibeh, 1U
Aljalal, Abdulaziz, 1O	Hamad, Mustapha, 1R, 1T
Alloush, M. Ali, 0N	Hamad, Wissam, 1R, 1T
Anders, Krzysztof, 28	Hamamoto, K., 0X
Arsenijevic, D., 0Y	Hegarty, Stephen P., 2D
Arslan, Seval, 1S, 2B	Hegazy, Salem F., 1Q
Auth, Dominik, 1Z, 22	Hein, Alexander, 14
Aydinli, Atilla, 0J, 1S, 2B	Henning, Ian, 0Z
Bader, Sven, 18	Herd, Andreas, 0H
Bakoz, Andrei P., 2D	Hoehne, Theresa, 1U
Bardella, Paolo, 23	Hofmann, Martin R., 05, 0N, 19
Barland, Stéphane, 1F	Hofmann, Werner, 1R, 1T
Bimberg, D., 0Y	Hong, You-Peng, 24
Birkholz, Martin, 1Y	Huang, H., 0Y
Borràs, Ramon, 1K	Huyet, Guillaume, 26
Bou Nassar, Serena, 1T	Javaloyes, Julien, 1Y
Bou Sanayeh, Marwan, 1R, 1T	Jiang, H., 0X
Brenner, Carsten, 0N	Juan, Yu-Shan, 24, 25
Breuer, Stefan, 1Y, 1Z, 22, 23	Juliachs, Jordi, 1K
Burger, Sven, 1U	Kaźmierczak, Andrzej, 28
Butler, Sharon M., 2D	Kelleher, Bryan, 0C, 1I
Carpintero, Guillermo, 0M	Khoder, Mulham, 1P
Cemlyn, Benjamin, 0Z	Klehr, Andreas, 0N, 1Z
Chen, C. Y., 0Y	Knigge, Andrea, 0N, 1Z
Chen, Shin-Cyuan, 24	Korobko, Dmitry A., 1V
Citrin, David, 1I	Kovalev, Anton V., 1I, 26
Columbo, Lorenzo L., 23	Lenstra, Daan, 0H
Dalal, Nataly, 1T	Lester, Luke F., 1Y, 22, 23
Daou, Oliver, 1R	Li, Nianqiang, 0Z
de Dios, Cristina, 1D	Liao, Ting-De, 25
del Río, Joaquín, 1K	Liles, Alexandros A., 2D
Demir, Abdullah, 0J, 1S, 2B	Lin, F. Y., 0Y
Dillane, Michael, 0C	Lin, L. C., 0Y
Dubinkin, Ilya, 0C	Lindemann, Markus, 05, 19
Elattar, Mohamed, 18	Lippi, G. L., 0Q
Elsäßer, Wolfgang, 0H	Lo, Mu-Chieh, 0M
Elsonbaty, Amr, 1Q	Locquet, Alexandre, 1I
Erneux, Thomas, 0C	Lott, James A., 1U
Fedorov, Nikita, 0C	Lu, Shao-Wei, 25
Fotiadi, Andrei A., 1V	Mi, Qinggai, 2C
Gasmi, Khaled, 1O	Michalzik, Rainer, 05, 18, 19
Gerhardt, Nils C., 05, 19	Miyamoto, Tomoyuki, 04
Gerlach, Philipp, 18	Mohr, Till, 0H
Gioannini, Mariangela, 23	Nakhle, Elio, 1R
Goulding, David, 0C, 1I	Nikiforov, Oleg, 1Y, 22

Nordin, M. N., 0O
 Obayya, Salah S. A., 1Q
 O'Faolain, Liam, 2D
 Oriach, Carles, 1K
 Panajotov, Krassimir, 1V
 Pańnikowska, Aleksandra, 28
 Pesquera, Luis, 1D
 Pilny, Rouven H., 0N
 Piramidowicz, Ryszard, 28
 Pisheh, Hadi Sedaghat, 0J
 Polanik, Markus, 14
 Prati, Franco, 1F
 Priante, D., 0O
 Przywarka, Thomas, 0N
 Puccioni, G. P., 0Q
 Pusch, Tobias, 05, 19
 Quirce, Ana, 1D
 Rebrova, Natalia, 26
 Rimoldi, Cristina, 1F
 Rontani, Damien, 10
 Şahin, Seval, 1S
 Scherübl, Sebastian, 19
 Sciamanna, Marc, 10
 Shakfa, M. K., 0O
 Shimomura, Kazuhiko, 0U
 Sirtori, Carlo, 0J
 Spirin, Vasily V., 1V
 Stopiński, Stanisław, 28
 Stutz, Sebastian, 22
 Susanto, Hadi, 0Z
 Tissoni, Giovanna, 1F
 Tomkiewicz, Marcin, 28
 Tränkle, Günther, 0N
 Tykalewicz, Bogusław, 11
 Unger, Peter, 14
 Uy, Chi-Hak, 10
 Valle, Angel, 1D
 Van der Sande, Guy, 1P
 Verschaffelt, Guy, 1P
 Viktorov, Evgeny A., 0C, 11, 26, 2D
 Vladimirov, Andrei G., 26
 Walther, Thomas, 22
 Wang, T., 0Q
 Wang, Xubao, 2C
 Weber, Christoph, 1Y, 1Z, 22, 23
 Weicker, Lionel, 10
 Weidmann, Markus, 0H
 Wishon, Michael J., 11
 W. Maryam, 0O
 Wu, Ming-Ju, 24
 Xiao, Rongshi, 2C
 Zolotovskiy, Igor O., 1V
 Zschiedrich, Lin, 1U

Conference Committee

Symposium Chairs

Francis Berghmans, Vrije Universiteit Brussel (Belgium)
Thierry Georges, Oxxius SA (France)
Harald Giessen, Universität Stuttgart (Germany)
Paul Montgomery, Université de Strasbourg (France)

Conference Chairs

Krassimir Panajotov, Vrije Universiteit Brussel (Belgium)
Marc Sciamanna, CentraleSupélec (France)
Rainer Michalzik, Universität Ulm (Germany)

Conference Programme Committee

Erwin A. J. M. Bente, Technische Universiteit Eindhoven (Netherlands)
Dieter Bimberg, Technische Universität Berlin (Germany)
Weng W. Chow, Sandia National Laboratories (United States)
Kent D. Choquette, University of Illinois at Urbana-Champaign (United States)
Tomasz G. Czystanowski, Lodz University of Technology (Poland)
Gadi Eisenstein, Technion-Israel Institute of Technology (Israel)
Wolfgang E. Elsässer, Technische Universität Darmstadt (Germany)
Hitoshi Kawaguchi, Nara Institute of Science and Technology (Japan)
Fumio Koyama, Tokyo Institute of Technology (Japan)
Michael Kneissl, Technische Universität Berlin (Germany)
Anders G. Larsson, Chalmers University of Technology (Sweden)
Fan-Yi Lin, National Tsing Hua University (Taiwan)
Cristina Masoller, Universitat Politècnica de Catalunya (Spain)
Luke J. Mawst, University of Wisconsin-Madison (United States)
Jesper Mørk, Technical University of Denmark (Denmark)
Johann Peter Reithmaier, Universität Kassel (Germany)
Carlo Sirtori, Université Paris 7-Denis Diderot (France)
Peter M. Smowton, Cardiff University (United Kingdom)
Anne C. Tropper, University of Southampton (United Kingdom)

Session Chairs

- 1 VCSELS
Rainer Michalzik, Universität Ulm (Germany)

- 2 Novel Concepts I
Michael Jetter, Institut für Halbleiteroptik und Funktionelle Grenzflächen (Germany)
- 3 Quantum Dot Lasers and Amplifiers
Ursula Keller, ETH Zurich (Switzerland)
- 4 Laser Nonlinear Dynamics I
Marc Sciamanna, CentraleSupélec (France)
- 5 Mode-locked Lasers and Frequency Combs
Mariangela Gioannini, Politecnico di Torino (Italy)
- 6 Nanolasers
Stephan Reitzenstein, Technische Universität Berlin (Germany)
- 7 On-Si Integration
Rainer Michalzik, Universität Ulm (Germany)
- 8 Laser Nonlinear Dynamics II
Eugene A. Avrutin, University of York (United Kingdom)
- 9 Novel Concepts II
Kresten Yvind, DTU Fotonik (Denmark)
- 10 Photonic Crystal Lasers/VCSELs
Giam-Luci Lippi, Université Côte d'Azur (France)
- 11 Novel Concepts III
Frédéric Grillot, Télécom ParisTech (France)
- 12 Spatiotemporal and Feedback-induced Dynamics
Krassimir Panajotov, Vrije Universiteit Brussel (Belgium)