

PROCEEDINGS OF SPIE

Light-Emitting Devices, Materials, and Applications XXVII

Jong Kyu Kim
Michael R. Krames
Martin Strassburg
Editors

30 January – 1 February 2023
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 12441

Proceedings of SPIE 0277-786X, V. 12441

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

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 *Light-Emitting Devices, Materials, and Applications XXVII*, edited by Jong Kyu Kim, Michael R. Krames, Martin Strassburg, Proc. of SPIE 12441, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510659872

ISBN: 9781510659889 (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.

**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

v *Conference Committee*

UV EMITTERS I

12441 02 **Performance of high power deep ultraviolet light-emitting diodes and factors limiting the lifetime (Invited Paper)** [12441-6]

12441 03 **UVC LED reliability and its effect on disinfection systems design** [12441-8]

LED GROWTH AND APPLICATIONS I

12441 04 **Challenges and opportunities of nitride light emitting devices by HVPE thanks to a stable Mg source (Invited Paper)** [12441-9]

UV EMITTERS II

12441 05 **Development in AlGaIn homojunction tunnel junction deep UV LEDs (Invited Paper)** [12441-12]

LIGHT-BASED SENSORS AND COMMUNICATION

12441 06 **Sub 1pJ/bit dense optical interconnects using microLEDs on CMOS transceiver ICs (Invited Paper)** [12441-17]

12441 07 **Increasing the detection range of non-scanning solid-state LiDAR systems using beam shaping** [12441-19]

MICRO LEDS AND AR/VR/MR/XR II

12441 08 **Native InGaIn red-green-blue micro-LEDs for full color micro-displays (Invited Paper)** [12441-20]

12441 09 **GaN-on-silicon nanowire technology for microLED devices (Invited Paper)** [12441-21]

LED GROWTH AND APPLICATIONS II

12441 0A **Advances in digital light source technology for lighting and display applications (Invited Paper)** [12441-23]

BORON NITRIDES

12441 0B **Hexagonal boron nitride: a source for quantum photonics applications (Invited Paper)** [12441-34]

MEASUREMENTS AND CHARACTERIZATIONS FOR LED MATERIALS AND DEVICES

12441 0C **Cathodoluminescence imaging for nanoscale optical analysis of microLEDs (Invited Paper)** [12441-40]

12441 0D **III-N optoelectronic devices: understanding the physics of electro-optical degradation (Invited Paper)** [12441-41]

12441 0E **Injection-limited efficiency of InGaN LEDs and impact on electro-optical performance and ageing: a case study** [12441-42]

POSTER SESSION

12441 0F **High-performance vacuum-deposited perovskite light-emitting diodes with the assistance of small-molecule hole-transport materials** [12441-43]

12441 0G **Using visible light communication to implement intelligent traffic signals and cooperative trajectories at urban intersections** [12441-47]

12441 0H **Mid-infrared resonant-cavity GaSb light emitting diodes with a metal back plane** [12441-48]

12441 0I **LED-based systems for remote sensing of liquid levels in automotive fluid tanks** [12441-51]

12441 0J **Optical pulse generation in nanosecond range with conventional high-power LED modules for metrology and calibration purposes** [12441-52]

12441 0K **Optoelectronic technologies to boost photobioreactors for algae production: from pulsed light sources to PV integrated net zero system** [12441-59]

12441 0L **Optimal detector size for optical wireless communication systems** [12441-61]

12441 0M **Demonstration of p-side down green light emitting diodes with high external quantum efficiencies** [12441-63]

12441 0N **Distorting optical system for automotive μ LED array headlamps** [12441-64]