

PROCEEDINGS OF SPIE

# ***Organic and Hybrid Light Emitting Materials and Devices XXVIII***

**Ji-Seon Kim  
Tae-Woo Lee  
Franky So**  
*Editors*

**18–21 August 2024  
San Diego, California, United States**

*Sponsored by*  
SPIE

*Cosponsored by*  
1-Material Inc. (Canada)

*Published by*  
SPIE

**Volume 13122**

Proceedings of SPIE 0277-786X, V. 13122

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](http://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 *Organic and Hybrid Light Emitting Materials and Devices XXVIII*, edited by Ji-Seon Kim, Tae-Woo Lee, Franky So, Proc. of SPIE 13122, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510679047

ISBN: 9781510679054 (electronic)

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

[SPIE.org](http://SPIE.org)

Copyright © 2024 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](http://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](http://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*

---

## ORGANIC LIGHT-EMITTING MATERIALS AND DEVICES II

---

13122 0V **Inverted singlet-triplet materials for organic light-emitting diodes** [13122-26]

---

## ORGANIC LIGHT-EMITTING MATERIALS AND DEVICES IV

---

13122 15 **Blue organic light-emitting diode operated by extremely low driving voltage (Invited Paper)** [13122-36]

---

## ORGANIC, INORGANIC LIGHT EMITTING MATERIALS AND DEVICES

---

13122 18 **Homoleptic iridium(III) carbene complexes as efficient blue OLED phosphors? (Invited Paper)** [13122-38]

---

## PHOTOPHYSICS OF PEROVSKITE LIGHT EMITTING MATERIALS

---

13122 1C **Photon recycling effect in perovskite LEDs and solar cells (Invited Paper)** [13122-41]