PROCEEDINGS OF SPIE

Organic, Hybrid, and Perovskite Photovoltaics XXIII

Gang Li Natalie Stingelin Editors

23–25 August 2022 San Diego, California, United States

Sponsored by SPIE

Cosponsored by Enli Technology Company Ltd. (Taiwan)

Published by SPIE

Volume 12209

Proceedings of SPIE 0277-786X, V. 12209

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 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 *Organic, Hybrid, and Perovskite Photovoltaics XXIII*, edited by Gang Li, Natalie Stingelin, Proc. of SPIE 12209, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510654020

ISBN: 9781510654037 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2022 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.



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

	HYBRID ORGANIC/INORGANIC PHOTOVOLTAICS I
12209 02	The interplay between device's and material's properties in determining solar cells' performance (Invited Paper) [12209-9]
	HYBRID ORGANIC/INORGANIC PHOTOVOLTAICS II
12209 03	Crystallized 2D perovskite for x-ray and visible light detection applications (Invited Paper) [12209-13]
	STABILITY, LIFETIME, AND RELIABILITY
12209 04	Low-cost perovskite materials for decentralized energy generation and Department of Defense environmental impact reduction [12209-33]
	POSTER SESSION
12209 05	Fabricate anti-solvent free tin-lead based perovskite solar cells with MAAc additives [12209-53]
12209 06	Neutral-colored semitransparent perovskite solar cells by controlling aperture ratios [12209-58]
12209 09	Synthesis and optical study of ultra-stable inorganic double perovskite Cs ₂ CuBiCl ₆ for optoelectronic applications [12209-44]
12209 0A	Experimental investigation of structural and photophysical nature of non-toxic Cs ₂ AlBiCl ₆ double perovskite for photovoltaic applications [12209-45]

Conference Committee

Symposium Chairs

Zakya H. Kafafi, Lehigh University (United States) **Ifor D. W. Samuel**, University of St. Andrews (United Kingdom)

Conference Chairs

Gang Li, The Hong Kong Polytechnic University (Hong Kong, China) **Natalie Stingelin**, Georgia Institute of Technology (United States)

Conference Co-Chairs

Ana Flávia Nogueira, University of Campinas (Brazil)
Thuc-Quyen Nguyen, University of California, Santa Barbara
(United States)

Ellen Moons, Karlstad University (Sweden)
Barry P. Rand, Princeton University (United States)

Conference Program Committee

Harald W. Ade, North Carolina State University (United States)Derya Baran, King Abdullah University of Science and Technology (Saudi Arabia)

David Beljonne, University de Mons (Belgium)

Hendrik J. Bolink, Universitat de València (Spain)

Paul L. Burn, The University of Queensland (Australia)

Alexander Colsmann, Karlsruher Institut für Technologie (Germany)

Daniel Congreve, Stanford University (United States)

Renaud Demadrille, Systèmes Moléculaires et nanoMatériaux pour l'Énergie et la Santé (France)

Giulia Grancini, Università degli Studi di Pavia (Italy)

Martin J. Heeney, Imperial College London (United Kingdom)

Zakya H. Kafafi, Lehigh University (United States)

Bumjoon Kim, KAIST (Korea, Republic of)

Monica Lira-Cantú, Institut Català de Nanociència i Nanotecnologia (ICN2) (Spain)

Paul Meredith, Swansea University (United Kingdom)

Hideo Ohkita, Kyoto University (Japan)

Annamaria Petrozza, Istituto Italiano di Tecnologia (Italy)

Ifor D. W. Samuel, University of St. Andrews (United Kingdom)

Shuxia Tao, Technische Universiteit Eindhoven (Netherlands)

Yana Vaynzof, TU Dresden (Germany)

Iris Visoly-Fisher, Ben-Gurion University of the Negev (Israel)

Atsushi Wakamiya, Kyoto University (Japan) **Hin-Lap (Angus) Yip**, City University of Hong Kong (China)