## PROCEEDINGS OF SPIE

## Photonic Heat Engines: Science and Applications V

Denis V. Seletskiy Masaru K. Kuno Peter J. Pauzauskie Editors

1–2 February 2023 San Francisco, California, United States

Sponsored and Published by SPIE

**Volume 12437** 

Proceedings of SPIE 0277-786X, V. 12437

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 *Photonic Heat Engines: Science and Applications V*, edited by Denis V. Seletskiy, Masaru K. Kuno, Peter J. Pauzauskie, Proc. of SPIE 12437, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510659797

ISBN: 9781510659803 (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.



**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

	PHOTONIC HEAT ENGINES AND APPLICATIONS
12437 02	Moving media as a photonic heat engine and pump (Invited Paper) [12437-9]
	RARE-EARTH CRYOCOOLERS AND APPLICATIONS
12437 03	Laser cooling silica: current status and future prospects [12437-3]
	SEMICONDUCTORS AND UPCONVERSION
12437 04	Evaluation of electron-phonon interactions in halide perovskites toward semiconductor optical refrigeration (Invited Paper) [12437-11]
	MATERIALS I
12437 05	Material approaches to thermal management in advanced fiber lasers and amplifiers (Keynote Paper) [12437-16]
12437 06	Ytterbium-doped $KY_3F_{10}$ as a promising material for optical cryocoolers (Invited Paper) [12437-18]
	MATERIALS II
12437 07	Cooling Yb-doped silica fibers and fiber lasers using anti-Stokes pumping (Invited Paper) [12437-21]

## **Conference Committee**

Symposium Chairs

Sonia M. García-Blanco, Universiteit Twente (Netherlands)
Bernd Witzigmann, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)

Symposium Co-chairs

**Ulrich T. Schwarz**, Technische Universität Chemnitz (Germany) **Karin Hinzer**, University of Ottawa (Canada)

Program Track Chair

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

Conference Chairs

**Denis V. Seletskiy**, Polytechnique Montréal (Canada) **Masaru K. Kuno**, University of Notre Dame (United States) **Peter J. Pauzauskie**, University of Washington (United States)

Conference Program Committee

Michel J. F. Digonnet, Stanford University (United States)
Peter D. Dragic, University of Illinois (United States)
Richard I. Epstein, ThermoDynamic Films LLC (United States)
Fedor Jelezko, Universität Ulm (Germany)
Raman Kashyap, Polytechnique Montréal (Canada)
Arash Mafi, The University of New Mexico (United States)
Ali Sayir, Air Force Office of Scientific Research (United States)
Mansoor Sheik-Bahae, The University of New Mexico (United States)
Mauro Tonelli, Università di Pisa (Italy)
Eli Yablonovitch, University of California, Berkeley (United States)