

PROCEEDINGS OF SPIE

# ***Infrared Remote Sensing and Instrumentation XXIX***

**Marija Strojnik**  
*Editor*

**1-5 August 2021**  
**San Diego, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 11830**

Proceedings of SPIE 0277-786X, V. 11830

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

Infrared Remote Sensing and Instrumentation XXIX, edited by Marija Strojnik, Proceedings of SPIE  
Vol. 11830, 1183001 · © 2021 SPIE · CCC code: 0277-786X/21/\$21 · doi: 10.1117/12.2606285

Proc. of SPIE Vol. 11830 1183001-1

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](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 *Infrared Remote Sensing and Instrumentation XXIX*, edited by Marija Strojnik, Proc. of SPIE 11830, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510644984  
ISBN: 9781510644991 (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 © 2021 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

---

## REMOTE SENSING INSTRUMENTS AND TECHNIQUES

---

- 11830 02 **Large scale infrastructure for precise time and frequency bidirectional transmission (Invited Paper)** [11830-1]
- 11830 03 **Design and development of multi-sensor based on all fiber NXN twisted plastic optical fiber** [11830-2]
- 11830 04 **Ground-based far-infrared emissivity measurements with the University of Wisconsin absolute radiance interferometer (ARI)** [11830-3]
- 11830 05 **Deep learning as a tool to recognize diffraction patterns on the far field** [11830-4]
- 11830 06 **Design and optimization of an infrared pixel based on Seebeck nanoantennas** [11830-5]
- 11830 07 **Rotationally shearing interferometry in the recovery of faint signals** [11830-6]
- 11830 08 **Optimal wavelength interval for extra-solar planet detection** [11830-7]

---

## SOLAR SYSTEM EXPLORATION

---

- 11830 09 **Scientific and instrumental requirements for VIS/IR studies of Venusian atmosphere from the upper cloud level down to the surface in the light of future space missions (Invited Paper)** [11830-8]
- 11830 0B **The data format of the MErcury Radiometer and Thermal Infrared Spectrometer (MERTIS) onboard BepiColombo (Invited Paper)** [11830-10]
- 11830 0C **Differential absorption LIDAR (DIAL) for remote sensing of ammonia: featuring a dual two-stage tandem mid-infrared optical parametric oscillator (Invited Paper)** [11830-11]
- 11830 0D **Maps and phase conjugated ring resonators dynamics (Invited Paper)** [11830-12]
- 11830 0E **III-V semiconductor mid-infrared interband cascade light emitters and detectors (Invited Paper)** [11830-13]

---

## POSTER SESSION

---

- 11830 0G **MIRS: an imaging spectrometer for the MMX mission** [11830-26]

- 11830 OK **Dynamic phase measurements employing a pixelated polarizing camera and temporal phase unwrapping algorithms** [11830-18]
- 11830 OM **Remote sensing system to monitoring of quality air using unmanned aerial vehicles and LoRa communication** [11830-20]
- 11830 ON **Spatial distribution analysis of two-dimensional microlens arrays by finite element method** [11830-21]
- 11830 OO **A lab proof-of-concept of an extrasolar planet detection using a rotationally shearing interferometer** [11830-22]
- 11830 OP **Classification of MRI's images using the Fractional Fourier transform and the local binary pattern information by artificial neural network** [11830-23]
- 11830 OQ **3D-profilometry of moving objects with abrupt surface discontinuities by projection of two-frequency color-coded fringe patterns** [11830-24]
- 11830 OR **Stitching technique applied to UV intrinsic fluorescence imaging in an in vivo wound-healing model** [11830-25]