

PROCEEDINGS OF SPIE

***Advanced Environmental,
Chemical, and Biological
Sensing Technologies XII***

**Tuan Vo-Dinh
Robert A. Lieberman
Günter G. Gauglitz**
Editors

**20–21 April 2015
Baltimore, Maryland, United States**

Sponsored and Published by
SPIE

Volume 9486

Proceedings of SPIE 0277-786X, V. 9486

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

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Advanced Environmental, Chemical, and Biological Sensing Technologies XII*, edited by Tuan Vo-Dinh, Robert A. Lieberman, Günter G. Gauglitz, Proceedings of SPIE Vol. 9486 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628416022

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)- Fax +1 360 647 1445

SPIE.org

Copyright © 2015, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/15/\$18.00.

Printed in the United States of America

Publication of record for individual papers is online in the SPIE Digital Library.



SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique citation identifier (CID) number is assigned to each article at the time of the first 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, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

Contents

- v *Authors*
vii *Conference Committee*

BIOSENSORS II

- 9486 05 **Light-directed functionalization methods for high-resolution optical fiber based biosensors** [9486-5]
9486 07 **Plasmonics-active gold nanostars for chemical and biological sensing using SERS detection** [9486-7]

ADVANCED SENSING TECHNOLOGIES

- 9486 09 **On-chip silicon photonic thermometers: from waveguide Bragg grating to ring resonators sensors** [9486-9]

CHEMICAL SENSING AND ANALYSIS

- 9486 0E **Dispersive Raman spectroscopy excited at 1064nm to classify the botanic origin of honeys from Calabria and quantify the sugar profile** [9486-14]
9486 0F **FTIR monitoring of methane from a local landfill** [9486-15]
9486 0G **A method for continuous in-situ pathlength calibration of integrating sphere based gas cells** [9486-16]
9486 0H **Real-time measurement of the NO₂ concentration in ambient air using a multi-mode diode laser and cavity enhanced multiple line integrated absorption spectroscopy** [9486-17]

STANDOFF ATMOSPHERIC MONITORING

- 9486 0I **Active stand-off detection of gas leaks using an open-path quantum cascade laser sensor in a backscatter configuration** [9486-18]
9486 0K **Development of differential absorption lidar (DIAL) for detection of CO₂, CH₄ and PM in Alberta** [9486-20]
9486 0L **Combined microphone array and lock-in amplifier operations for outdoor photo-acoustic sensing** [9486-21]
9486 0M **Standoff detection of trace chemicals with laser dispersion spectrometer** [9486-22]

SENSING METHODS AND ENABLING TECHNOLOGIES

- 9486 0N **Microfluidics for spectrochemical applications** [9486-23]
- 9486 0O **Multispectral light scattering imaging and multivariate analysis of airborne particulates** [9486-24]
- 9486 0P **Universal optical platform for monitoring of bioprocess variables** [9486-25]
- 9486 0Q **An agent-based mathematical model about carp aggregation** [9486-26]

INTERACTIVE POSTER SESSION

- 9486 0S **Global nuclear radiation monitoring using plants** [9486-28]
- 9486 0V **Oil and gas deposits determination by ultraspectral lidar** [9486-31]
- 9486 0W **Lidar for monitoring methane hydrate in the arctic permafrost** [9486-32]
- 9486 0X **Monitoring radioactive contamination by hyperspectral lidar** [9486-33]
- 9486 0Y **Chemical agent registration method on the basis of surface optical sensitization and surface plasmon resonance** [9486-34]
- 9486 10 **Quality control in the recycling stream of PVC cable waste by hyperspectral imaging analysis** [9486-36]
- 9486 11 **On-chip surface-enhanced Raman spectroscopy (SERS)-linked immuno-sensor assay (SLISA) for rapid environmental-surveillance of chemical toxins** [9486-38]
- 9486 12 **Endmember signature based detection of flammable gases in LWIR hyperspectral images** [9486-37]
- 9486 13 **Ring resonators in polymer foils for sensing of gaseous species** [9486-39]
- 9486 14 **New possibilities to analyse non-standard explosives and post blast residues in forensic practice** [9486-40]