

# PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

## Front Matter: Volume 9108

, "Front Matter: Volume 9108," Proc. SPIE 9108, Sensing for Agriculture and Food Quality and Safety VI, 910801 (11 June 2014); doi: 10.1117/12.2072201

**SPIE.**

Event: SPIE Sensing Technology + Applications, 2014, Baltimore, Maryland, United States

PROCEEDINGS OF SPIE

# ***Sensing for Agriculture and Food Quality and Safety VI***

**Moon S. Kim  
Kuanglin Chao**  
*Editors*

**6–7 May 2014  
Baltimore, Maryland, United States**

*Sponsored and Published by*  
SPIE

**Volume 9108**

Proceedings of SPIE 0277-786X, V. 9108

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

Sensing for Agriculture and Food Quality and Safety VI, edited by Moon S. Kim, Kuanglin Chao,  
Proc. of SPIE Vol. 9108, 910801 · © 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2072201

Proc. of SPIE Vol. 9108 910801-1

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 *Sensing for Agriculture and Food Quality and Safety VI*, edited by Moon S. Kim, Kuanglin Chao, Proceedings of SPIE Vol. 9108 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628410457

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 © 2014, 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](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. The CCC fee code is 0277-786X/14/\$18.00.

Printed in the United States of America.

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



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

---

**Paper Numbering:** Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent 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. Numbers in the index correspond to the last two digits of the six-digit CID Number.

# Contents

v *Conference Committee*

---

## BIOSENSORS FOR PATHOGEN DETECTION

---

- 9108 02 **Effects of food surface topography on phage-based magnetoelastic biosensor detection** [9108-8]  
S. Horikawa, Y. Chai, R. Zhao, H. C. Wickle, B. A. Chin, Auburn Univ. (United States)
- 9108 04 **Pulsed excitation system to measure the resonant frequency of magnetoelastic biosensors** [9108-10]  
H. Xie, Y. Chai, S. Horikawa, H. C. Wickle, B. A. Chin, Auburn Univ. (United States)
- 9108 05 **Self-propelled, phage-based magnetoelastic biosentinel for detection of pathogens in liquid** [9108-18]  
S. Horikawa, R. Zhao, Y. Chai, H. C. Wickle, B. A. Chin, Auburn Univ. (United States)

---

## HYPERSPECTRAL AND MULTISPECTRAL IMAGING

---

- 9108 0A **Hyperspectral fluorescence imaging coupled with multivariate image analysis techniques for contaminant screening of leafy greens** [9108-21]  
C. D. Everard, Univ. College Dublin (Ireland); M. S. Kim, H. Lee, USDA Agricultural Research Service (United States)
- 9108 0B **Differentiating glyphosate-resistant and glyphosate-sensitive Italian ryegrass using hyperspectral imagery** [9108-22]  
M. A. Lee, Mississippi State Univ. (United States); Y. Huang, V. K. Nandula, K. N. Reddy, USDA Agricultural Research Service (United States)

---

## RAMAN SPECTROSCOPY AND IMAGING

---

- 9108 0F **High-throughput Raman chemical imaging for evaluating food safety and quality** [9108-17]  
J. Qin, K. Chao, M. S. Kim, USDA Agricultural Research Service (United States)
- 9108 0G **Detection of pathogens in food using a SERS-based assay in just a few hours** [9108-26]  
C. Shende, A. Sengupta, H. Huang, S. Farquharson, Real-Time Analyzers, Inc. (United States)

---

## POSTER SESSION

---

- 9108 0K **Analytical model of contamination during the drying of cylinders of jamonable muscle** [9108-1]  
I. Montoya Arroyave, Univ. EAFIT (Colombia)

- 9108 0L **A model of freezing foods with liquid nitrogen using special functions** [9108-5]  
M. Rodríguez Vega, Univ. EAFIT (Colombia)
- 9108 0M **An analytically resolved model of a potato's thermal processing using Heun functions** [9108-6]  
A. Vargas Toro, Univ. EAFIT (Colombia)
- 9108 0N **Mathematical model for solar drying of potato cylinders with thermal conductivity radially modulated** [9108-7]  
M. Trujillo Arredondo, Univ. EAFIT (Colombia)
- 9108 0O **Rapid detection of chlorpyrifos pesticide residue concentration in agro-product using Raman spectroscopy** [9108-11]  
S. Dhakal, Y. Peng, Y. Li, China Agricultural Univ. (China); K. Chao, J. Qin, USDA Agricultural Research Service (United States); L. Zhang, T. Xu, China Agricultural Univ. (China)
- 9108 0P **A portable detection instrument based on DSP for beef marbling** [9108-12]  
T. Zhou, Y. Peng, China Agricultural Univ. (China)
- 9108 0Q **A portable device for rapid nondestructive detection of fresh meat quality** [9108-13]  
W. Lin, Y. Peng, China Agricultural Univ. (China)
- 9108 0R **Nondestructive detection of pork comprehensive quality based on spectroscopy and support vector machine** [9108-14]  
Y. Liu, China Agricultural Univ. (China) and Tarim Univ. (China); Y. Peng, L. Zhang, S. Dhakal, China Agricultural Univ. (China); C. Wang, Xinjiang Yurun Food Group Ltd. (China)
- 9108 0S **Detection of the total viable counts in chicken based on visible/near-infrared spectroscopy** [9108-23]  
F. Jiang, Y. Long, X. Tang, L. Zhao, Y. Peng, China Agricultural Univ. (China); C. Wang, Xinjiang Yurun Food Group Ltd. (China)
- 9108 0V **A HyperSpectral Imaging (HSI) approach for bio-digestate real time monitoring** [9108-4]  
G. Bonifazi, A. Fabbri, S. Serranti, Univ. degli Studi di Roma La Sapienza (Italy)

*Author Index*

# Conference Committee

## *Symposium Chair*

**David A. Whelan**, Boeing Defense, Space, and Security  
(United States)

## *Symposium Co-chair*

**Wolfgang Schade**, Technische Universität Clausthal (Germany) and  
Fraunhofer Heinrich-Hertz-Institut (Germany)

## *Conference Chairs*

**Moon S. Kim**, USDA Agricultural Research Service (United States)  
**Kuanglin Chao**, USDA Agricultural Research Service (United States)

## *Conference Program Committee*

**Arun K. Bhunia**, Center for Food Safety Engineering, Purdue University  
(United States)  
**Suming Chen**, National Taiwan University (Taiwan)  
**Bryan A. Chin**, Auburn University (United States)  
**Byoung-Kwan Cho**, Chungnam National University  
(Korea, Republic of)  
**Stephen R. Delwiche**, USDA Agricultural Research Service  
(United States)  
**Ki-Bok Kim**, Korea Research Institute of Standards and Science  
(Korea, Republic of)  
**Naoshi Kondo**, Kyoto University Graduate School of Agriculture  
(Japan)  
**Kurt C. Lawrence**, USDA Agricultural Research Service (United States)  
**Kangjin Lee**, National Academy of Agricultural Science  
(Korea, Republic of)  
**Alan M. Lefcourt**, USDA Agricultural Research Service (United States)  
**Changying (Charlie) Li**, The University of Georgia (United States)  
**Renfu Lu**, USDA Agricultural Research Service (United States)  
**Bosoon Park**, USDA Agricultural Research Service (United States)  
**Yang Tao**, University of Maryland, College Park (United States)  
**Yankun Peng**, China Agricultural University (China)  
**Gang Yao**, University of Missouri-Columbia (United States)  
**Haibo Yao**, Mississippi State University (United States)  
**Yibin Ying**, Zhejiang University (China)

**Seung-Chul Yoon**, USDA Agricultural Research Service (United States)

*Session Chairs*

- 1 Biosensors for Pathogen Detection  
**Bryan A. Chin**, Auburn University (United States)
- 2 Hyperspectral Imaging  
**Jianwei Qin**, Agricultural Research Service (United States)
- 3 Hyperspectral and Multispectral Imaging  
**Seung-Chul Yoon**, Agricultural Research Service (United States)
- 4 Raman Spectroscopy and Imaging  
**Byoung-Kwan Cho**, Chungnam National University  
(Korea, Republic of)