## **PROCEEDINGS OF SPIE**

# Non-Intrusive Inspection Technologies II

Brandon W. Blackburn Editor

14 April 2009 Orlando, Florida, United States

Sponsored and Published by SPIE

Volume 7310

Proceedings of SPIE, 0277-786X, v. 7310

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 *Non-Intrusive Inspection Technologies II*, edited by Brandon W. Blackburn, Proceedings of SPIE Vol. 7310 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 0277-786X ISBN 9780819475763

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 © 2009, 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/09/\$18.00.

Printed in the United States of America.

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



**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 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

#### SESSION 1 REMOTE SENSING

- 7310 02 Optical and engineering development of the spatial heterodyne interferometer for emergent line discrimination spectroscopy (SHIELDS) [7310-01]
   S. Watchorn, J. Noto, Scientific Solutions, Inc. (United States); J. Anderson, U.S. Army Engineer Research and Development Ctr. (United States); C. E. Sioris, Environment Canada (Canada)
- The Raytheon-SORDS trimodal imager [7310-02]
   M. V. Hynes, M. Toolin, B. Harris, J. McElroy, Raytheon Co. (United States); M. S. Wallace,
   L. J. Schultz, M. Galassi, A. Hoover, M. Mocko, D. Palmer, S. Tornga, Los Alamos National Lab. (United States); D. Wakeford, H. R. Andrews, E. T. H. Clifford, L. Li, N. Bray, D. Locklin, Bubble Technology Industries, Inc. (Canada); R. Lanza, B. Horn, Massachusetts Institute of Technology (United States); D. Wehe, Univ. of Michigan (United States)
- A solid-state hyperspectral imager for real-time standoff explosives detection using shortwave infrared imaging [7310-03]
   B. M. Onat, G. Carver, M. Itzler, Princeton Lightwave, Inc. (United States)

#### SESSION 2 INSPECTION HARDWARE AND MATERIALS

7310 07 LuAG:Pr, LuAG:La, and LuAP:Ce thin film scintillators for visualisation of x-ray images [7310-06]

Y. Zorenko, V. Gorbenko, T. Voznyak, Ivan Franko National Univ. of L'viv (Ukraine); T. Martin, P.-A. Douissard, European Synchrotron Radiation Facility (France); J. A. Mares, M. Nikl, Institute of Physics (Czech Republic)

7310 08 Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>-based materials for high 2D-resolution scintillation detectors [7310-07] M. Nikl, Institute of Physics (Czech Republic); J. Tous, Crytur Ltd. (Czech Republic); J. A. Mares, Institute of Physics (Czech Republic); P. Prusa, Institute of Physics (Czech Republic) and Czech Technical Univ. in Prague (Czech Republic); E. Mihokova, Institute of Physics (Czech Republic) and Univ. of Milano-Bicocca (Italy); K. Blazek, Crytur Ltd. (Czech Republic); A. Vedda, Univ. of Milano-Bicocca (Italy); Yu. Zorenko, V. Gorbenko, Ivan Franko National Univ. of L'viv (Ukraine); V. Babin, Univ. of Tartu (Estonia)

#### SESSION 3 INSPECTION METHODOLOGIES AND CONOPS

7310 0B Real time Muon tomography imaging simulation and fast threat target identification
[7310-10]
 H. M. Jaenisch, LSEI Consultants (United States), Johns Hopkins Univ. (United States), James
Cook Univ. (Australia). Alabama A&M Univ. (United States), and Amtec Corp. (United

Cook Univ. (Australia), Alabama A&M Univ. (United States), and Amtec Corp. (United States); J. W. Handley, LSEI Consultants (United States) and Amtec Corp. (United States); K. L. Jaenisch, LSEI Consultants (United States); N. G. Albritton, Amtec Corp. (United States)

- 7310 0C **A quantitative measure for information content in antenna array radiation patterns** [7310-11] K. D. Mohan, M. A. Khan, A. N. Dharamsi, Old Dominion Univ. (United States)
- 7310 0D The SORDS trimodal imager detector arrays [7310-12] D. Wakeford, H. R. Andrews, E. T. H. Clifford, L. Li, N. Bray, D. Locklin, Bubble Technology Industries (Canada); M. V. Hynes, M. Toolin, B. Harris, J. McElroy, Raytheon Co. (United States); M. Wallace, Los Alamos National Lab. (United States); R. Lanza, Massachusetts Institute of Technology (United States)
- 7310 0I Illicit drug detection using energy dispersive x-ray diffraction [7310-17] E. J. Cook, J. A. Griffiths, Univ. College London (United Kingdom); M. Koutalonis, Barts and the London NHS Trust (United Kingdom); C. Gent, Home Office Scientific Development Branch (United Kingdom); S. Pani, J. A. Horrocks, Barts and the London NHS Trust (United Kingdom); L. George, S. Hardwick, Home Office Scientific Development Branch (United Kingdom); R. Speller, Univ. College London (United Kingdom)

Author Index

## **Conference Committee**

Symposium Chair

Ray O. Johnson, Lockheed Martin Corporation (United States)

Symposium Cochair

Michael T. Eismann, Air Force Research Laboratory (United States)

#### Conference Chair

Brandon W. Blackburn, Raytheon Company (United States)

#### Program Committee

David L. Chichester, Idaho National Laboratory (United States)
Paul Hausladen, Oak Ridge National Laboratory (United States)
Alan Hunt, Idaho State University (United States)
Dwight L. Williams, Massachusetts Institute of Technology (United States)
Joseph W. Schumer, Naval Research Laboratory (United States)

#### Session Chairs

- Remote Sensing
   Joseph W. Schumer, Naval Research Laboratory (United States)
- 2 Inspection Hardware and Materials **Paul Hausladen**, Oak Ridge National Laboratory (United States)
- Inspection Methodologies and CONOPS
   David L. Chichester, Idaho National Laboratory (United States)