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Front Matter: Volume 8373

, "Front Matter: Volume 8373," Proc. SPIE 8373, Micro- and Nanotechnology Sensors, Systems, and Applications IV, 837301 (11 June 2012); doi: 10.1117/12.976316

SPIE.

Event: SPIE Defense, Security, and Sensing, 2012, Baltimore, Maryland, United States

PROCEEDINGS OF SPIE

Micro- and Nanotechnology Sensors, Systems, and Applications IV

**Thomas George
M. Saif Islam
Achyut Dutta**
Editors

**23–27 April 2012
Baltimore, Maryland, United States**

Sponsored and Published by
SPIE

Volume 8373

Proceedings of SPIE, 0277-786X, v. 8373

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

Micro- and Nanotechnology Sensors, Systems, and Applications IV, edited by
Thomas George, M. Saif Islam, Achyut Dutta, Proc. of SPIE Vol. 8373, 837301
© 2012 SPIE · CCC code: 0277-786X/12/\$18 · doi: 10.1117/12.976316

Proc. of SPIE Vol. 8373 837301-1

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.

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Author(s), "Title of Paper," in *Micro- and Nanotechnology Sensors, Systems, and Applications IV*, edited by Thomas George, M. Saif Islam, Achyut Dutta, Proceedings of SPIE Vol. 8373 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN 0277-786X

ISBN 9780819490513

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

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Introduction

The 2012 Micro- and Nanotechnology Sensors, Systems, and Applications IV conference continued its successful approach of showcasing a diverse range of MEMS and Nanotechnology topics that are testament to the practically limitless applications of these exciting technologies. We also continued to build on the synergies between our conference and other, equally diverse, sets of conferences by having joint sessions with the Scanning Microscopies (8378), Energy Harvesting and Storage (8377), Unmanned Systems Technology (8387) and the Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing (8358) conferences. Exciting new sessions that were introduced in 2012 were on Mesodynamic Architectures (based on the program by the same name managed by Dr. Jeffrey Rogers, DARPA), Novel Micro/Nano Approaches for Radiation Sensors and Materials, Scanning Microscopies for Micro- and Nanotechnology Applications (Joint Session), Beam Control Systems Using MEMS and Liquid Crystals, Heterogeneous Integration of Multifunctional Materials, Devices, and Micro/Nanosystems, Nanomaterials for Armor Applications, New Boundaries and Frontiers for MEMS, and Applications of Nanomaterials for Surface Enhanced RAMAN Spectroscopy (SERS).

As in previous years, each session was designed to address three “cornerstones” namely, programmatic investments that set the overall context for the cutting-edge research and development being presented, and the challenges involved in transitioning these exciting concepts to applications in defense, homeland security and space. We were fortunate to showcase advanced micro and nanoscale research being conducted by the Air Force Office of Scientific Research, National Institutes of Health, Department of Energy, Office of Naval Research and the Naval Research Laboratory, Army Research Laboratory, NASA, and the Defense Advanced Research Projects Agency.

Thanks to our distinguished contributors, in this proceedings volume, you will find papers covering a breathtaking range of topics from Topological Insulators to lens-free holographic imaging of cells. This year we have continued an exploration of the sensors and sensor platforms required for ARL's Micro Autonomous Systems. The drive to miniaturization has brought about challenging SWaP (Size, Weight and Power) constraints, once the exclusive domain of NASA spacecraft, to these Micro Autonomous Systems platforms and to the sensors that could be integrated on these exciting new platforms.

Thomas George
M. Saif Islam
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