PROCEEDINGS OF SPIE

Nanoengineering: Fabrication, Properties, Optics, and Devices IV

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Editors

27–30 August 2007
San Diego, California, USA

Sponsored and Published by
SPIE

Volume 6645

Proceedings of SPIE, 0277-786X, v. 6645

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Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *Nanoengineering: Fabrication, Properties, Optics, and Devices IV*, edited by Elizabeth A. Dobisz, Louay A. Eldada, Proceedings of SPIE Vol. 6645 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819467935

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

Printed in the United States of America.

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

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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:

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Contents

SESSION 12 NANOPROCESSING TECHNOLOGIES AND NANOSYSTEMS FOR MEDICAL APPLICATIONS

POSTER SESSION

Conference Committee

Symposium Chairs

David L. Andrews, University of East Anglia Norwich (United Kingdom)
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Ghassan E. Jabbour, Arizona State University (USA)
Miguel Levy, Michigan Technological University (USA)
Robert Magnusson, University of Connecticut (USA)
Juan R. Maldonado, Stanford University (USA)
Jun Tanida, Osaka University (Japan)
Chee Wei Wong, Columbia University (USA)

Session Chairs

1 Photonic Crystals
Louay A. Eldada, DuPont Photonics Technologies (USA)

2 Nano-Biotechnology
Elizabeth A. Dobisz, Hitachi Global Storage Technologies (USA)

3 Optical Interconnects
El-Hang Lee, Inha University (South Korea)

4 Nanofabricated Optical Devices
Louay A. Eldada, DuPont Photonics Technologies (USA)

5 Quantum Dots and Wires
Elizabeth A. Dobisz, Hitachi Global Storage Technologies (USA)

6 Nanostructure Engineering
Yusuke Ogura, Osaka University (Japan)

7 Thin Film Nanostructure Optics
Gregory J. Exarhos, Pacific Northwest National Laboratory (USA)

8 Organic Nanostructures
Louay A. Eldada, DuPont Photonics Technologies (USA)

9 Nanotubes
Elizabeth A. Dobisz, Hitachi Global Storage Technologies (USA)

10 Nanowires, Nanofibers, and Nanorods
André-Jean Attias, Université Pierre et Marie Curie (France)

11 Optofluidics
Demetri Psaltis, École Polytechnique Fédérale de Lausanne (Switzerland)
Yeshaiahu Fainman, University of California, San Diego (USA)

12 Nanoprocessing Technologies and Nanosystems for Medical Applications
Frederic Zenhausern, Arizona State University (USA)

Introduction

This volume features contributions from scientists and engineers in the general area of nanoengineering. Over the past couple of years, mature technologies such as logic, memory, and data storage have been rapidly thrust into the sub-100nm regime. Existing processes of record have been extended well beyond the ranges deemed feasible or reliable. New technologies such as biotechnology, medical nanosystems, 3D sensors, 3D displays, systems on a chip, optofluidics, nanophotonics, and molecular electronics and optics are emerging. The upcoming synthesized nanomaterials, nanotubes, and nanowires, offer extremely attractive physical features and great opportunities. Continuing improvements in the design and fabrication of micro/nano/quantum-scale optical elements have driven the development of passive and active miniature optical components with applications in ever more diverse areas of photonics. These areas include optical communication, neural systems, optical information processing, optical computing, optical storage, optical scanning, smart pixel arrays, information display, imaging, printing, medical diagnosis, and chemical and biological sensing. Emerging nanotechnologies present new opportunities and challenges in materials processing, device design, and integration. Drivers for commercial deployment include function, performance, reliability, space, and cost.

Papers in these proceedings include discussions of materials nanoengineering, properties of nanostructures, innovative patterning and processing techniques, micro/nano/quantum optics, and fabrication and packaging of miniature devices. Some papers describe the refinement of existing schemes and processes, while others introduce novel concepts and new designs. Papers from academic and research institutions push the state of the art in miniaturization, level of integration, and performance figures of merit, and papers from the industry emphasize design criteria and manufacturing methods that result in practical components and systems that can be deployed commercially.

Although this volume cannot include all the recent important work in the vast field of nanoengineering, it does cover a significant cross-section of the advances happening globally in areas where nanoengineering is making an impact. We hope these papers by world-renown experts serve the purpose of bringing the readers up to date on the state of the art in this fast-growing and exciting field.

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