PROCEEDINGS OF SPIE

Nanobiotronics

Emily M. Heckman Thokchom B. Singh Junichi Yoshida Editors

26–27 August 2007 San Diego, California, USA

Sponsored and Published by SPIE

Volume 6646

Proceedings of SPIE, 0277-786X, v. 6646

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 *Nanobiotronics*, edited by Emily M. Heckman, Thokchom B. Singh, Junichi Yoshida, Proceedings of SPIE Vol. 6646 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X ISBN 9780819467942

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 © 2007, 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/07/\$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

•	Completive Committee
SESSION 1	BIO-POLYMER PHOTONICS
6646 03	DNA-hybrid materials for photonic applications (Invited Paper) [6646-02] N. Ogata, Ogata Research Lab., Ltd. (Japan); Y. Kagami, M. Wada, J. Yoshida, Chitose Institute of Science and Technology (Japan)
SESSION 2	INVESTIGATION AND CHARACTERIZATION TECHNIQUES OF DNA FILMS
6646 05	Resistivity and electric-field poling behaviors of DNA-based polymers compared to selected non-DNA polymers [6646-04] P. P. Yaney, Univ. of Dayton (USA); E. M. Heckman, General Dynamics Information Technology (USA); J. G. Grote, Air Force Research Lab. (USA)
6646 06	Structure and optoelectrical properties of photopolymerized PAn/DNA complex (Invited Paper) [6646-05] N. Kobayashi, T. Morimoto, T. Ushikubo, Chiba Univ. (Japan)
6646 07	Prism coupler and microscopic investigations of DNA films (Invited Paper) [6646-06] A. Samoc, The Australian National Univ. (Australia); Z. Galewski, Univ. of Wroclaw (Poland) M. Samoc, The Australian National Univ. (Australia); J. G. Grote, Air Force Research Lab. (USA)
SESSION 3	NLO PROCESSES IN BIOMATERIALS
6646 08	Thin film dye lasers based on DNA-lipid complex materials (Invited Paper) [6646-07] J. Yoshida, H. Takano, S. Narisawa, S. Takenaka, N. Nakai, M. Fukuda, N. Ogata, Chitose Institute of Science and Technology (Japan)
6646 09	Optical amplification and laser action in cyanine dyes doped in DNA complex [6646-08] M. Honda, N. Nakai, M. Fukuda, Y. Kawabe, Chitose Institute of Science and Technology (Japan)
6646 OA	Cubic nonlinear optical effects in deoxyribonucleic acid (DNA) based materials containing chromophores [6646-09] M. Samoc, The Australian National Univ. (Australia) and SUNY at Buffalo (USA); A. Samoc, The Australian National Univ. (Australia); A. Miniewicz, The Australian National Univ. (Australia) and Wroclaw Univ. of Technology (Poland); P. P. Markowicz, P. N. Prasad, SUNY at Buffalo (USA); J. G. Grote, Air Force Research Lab. (USA)

SESSION 4	APPLICATION AND CHARACTERIZATION OF BIO/NANOMATERIALS
6646 OD	Design of an all-optical spatial light modulator and logic gates with phototropin [6646-12] S. Roy, K. Kulshrestha, Dayalbagh Educational Institute (India)
SESSION 5	BIOLOGICAL SYSTEMS AND APPLICATIONS
6646 OF	An integrated bionanosensing method for airborne toxin detection [6646-15] M. H. Griep, K. Walczak, E. Winder, D. R. Lueking, C. R. Friedrich, Michigan Technological Univ. (USA)
6646 OH	The development of a nano-IMU using buoyancy-driven convection coupled with chemistry [6646-18] M. E. Tanner, J. M. Protz, Duke Univ. (USA)
6646 OI	Experimental and Monte Carlo studies of diffraction grating inscription in DNA-based materials [6646-19] A. C. Mitus, G. Pawlik, Wroclaw Univ. of Technology (Poland); A. Kochalska, J. Mysliwiec, A. Miniewicz, Institute of Physical and Theoretical Chemistry (Poland); F. Kajzar, Lab. POMA, CNRS, Univ. d'Angers (France)
SESSION 6	BIO-MATERIALS FOR SEMICONDUCTOR AND SENSOR APPLICATIONS
6646 OK	Bio-organic field effect transistors [6646-21] C. M. Bartsch, Univ. of Dayton (USA) and Air Force Research Lab. (USA); G. Subramanyam, Univ. of Dayton (USA); J. G. Grote, K. M. Singh, R. R. Naik, Air Force Research Lab. (USA); B. Singh, N. S. Sariciftci, Johannes Kepler Univ. of Linz (Austria)
6646 0M	High sensitivity surface enhanced Raman scattering detection in hollow core microstructured optical fibre [6646-23] F. M. Cox, A. Argyros, M. C. J. Large, Univ. of Sydney (Australia); S. Kalluri, Ilumed, LLC (USA)
	Author Index

Conference Committee

Symposium Chairs

David L. Andrews, University of East Anglia Norwich (United Kingdom) **James G. Grote**, Air Force Research Laboratory (USA) **Kevin J. Liddane**, Oerlikon Optics USA, Inc. (USA)

Conference Chairs

Emily M. Heckman, Air Force Research Laboratory (USA)

Thokchom B. Singh, Johannes Kepler Universität Linz (Austria)

Junichi Yoshida, Chitose Institute of Science and Technology (Japan)

Program Committee

Liming Dai, University of Dayton (USA)

Ananth Dodabalapur, The University of Texas, Austin (USA)

James G. Grote, Air Force Research Laboratory (USA)

Kuniharu Ijiro, Hokkaido University (Japan)

Jung-II Jin, Korea Academy of Science and Technology (South Korea)

Francois Kajzar, Université d'Angers (France)

Norihisa Kobayashi, Chiba University (Japan)

Oksana Krupka, Université d'Angers (France)

Charles Y. C. Lee, Air Force Office of Scientific Research (USA)

Misoon Mah, Asian Office of Aerospace Research and Development (Japan)

Naoya Ogata, Chitose Institute of Science and Technology (Japan)

Ileana Rãu, Université d'Angers (France)

Bruce H. Robinson, University of Washington (USA)

Anna Samoc, The Australian National University (Australia)

Marek J. Samoc, The Australian National University (Australia)

Niyazi S. Sariciftci, Johannes Kepler Universität Linz (Austria)

Andrew J. Steckl, University of Cincinnati (USA)

Morley O. Stone, Air Force Research Laboratory (USA)

Perry P. Yaney, University of Dayton (USA)

Session Chairs

- Bio-Polymer Photonics
 James G. Grote, Air Force Research Laboratory (USA)
- 2 Investigation and Characterization Techniques of DNA Films Marek J. Samoc, The Australian National University (Australia)

- NLO Processes in Biomaterials
 Anna Samoc, The Australian National University (Australia)
- 4 Application and Characterization of Bio/Nanomaterials **Junichi Yoshida**, Chitose Institute of Science and Technology (Japan)
- Biological Systems and ApplicationsPerry P. Yaney, University of Dayton (USA)
- 6 Bio-Materials for Semiconductor and Sensor Applications **James G. Grote**, Air Force Research Laboratory (USA)