## **PROCEEDINGS OF SPIE**

# Nanobiosystems: Processing, Characterization, and Applications IV

Norihisa Kobayashi Fahima Ouchen Ileana Rau Editors

21–22 August 2011 San Diego, California, United States

Sponsored and Published by SPIE

Volume 8103

Proceedings of SPIE, 0277-786X, v. 8103

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 Nanobiosystems: Processing, Characterization, and Applications IV, edited by Norihisa Kobayashi, Fahima Ouchen, Ileana Rau, Proceedings of SPIE Vol. 8103 (SPIE, Bellingham, WA, 2011) Article CID Number.

ISSN 0277-786X ISBN 9780819487131

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 © 2011, 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/11/\$18.00.

Printed in the United States of America.

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



SI IEDIGITAIEIDIAI 9.019

**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

#### SESSION 1 DNA APPLICATIONS

8103 02 Developments of highly sensitive DNA sensors (Keynote Paper) [8103-01] N. Ogata, Ogata Research Lab., Ltd. (Japan)

#### SESSION 2 MULTIFUNCTIONAL MATERIALS I

8103 06 Photophysical properties of lanthanide(III) chelates-doped DNA-CTMA complex (Invited Paper) [8103-05]

K. Nakamura, A. Sagara, N. Kobayashi, Chiba Univ. (Japan)

- 8103 07 Metal incorporated M-DNA: structure, magnetism, optical absorption (Invited Paper) [8103-06]
   K. Mizoguchi, Tokyo Metropolitan Univ. (Japan)
- 8103 08 Optical properties of DNA-CTMA biopolymers and applications in metal-biopolymer-metal photodetectors [8103-07]
   B. Zhou, Univ. at Buffalo, SUNY (United States); S. J. Kim, Univ. of Miami (United States);
   C. M. Bartsch, E. M. Heckman, F. Ouchen, Air Force Research Lab. (United States);
   A. N. Cartwright, Univ. at Buffalo, SUNY (United States)
- 8103 09 Towards modelling of stochastic kinetics for process related to photochromic dye semi-intercalation in DNA-based polymer matrix (Invited Paper) [8103-13]
   A. C. Mitus, G. Pawlik, W. Kordas, J. Mysliwiec, A. Miniewicz, Wroclaw Univ. of Technology (Poland); F. Kajzar, Polytechnical Univ. of Bucharest (Romania) and Univ. d'Angers (France); I. Rau, Polytechnical Univ. of Bucharest (Romania); J. G. Grote, Air Force Research Lab. (United States)

#### SESSION 3 MULTIFUNCTIONAL MATERIALS II

- 8103 0A Fabrication of natural DNA-containing organic light emitting diodes (Invited Paper) [8103-09]
   E. F. Gomez, H. D. Spaeth, A. J. Steckl, Univ. of Cincinnati (United States); J. G. Grote, Air Force Research Lab. (United States)
- 8103 0B **DNA architectures for templated material growth** [8103-10] A. S. Finch, C. M. Jacob, J. J. Sumner, U.S. Army Research Lab. (United States)

#### SESSION 4 MULTIFUNCTIONAL MATERIALS III

- 8103 0D Influence of DNA on J-aggregate formation of cyanine dyes (Invited Paper) [8103-12] Y. Kawabe, S. Kato, Chitose Institute of Science and Technology (Japan)
- 8103 0E Evanescent field excitation of Cy5-conjugated lipid bilayers using optical microcavities

   [8103-08]
   L. M. Freeman, Y. Dayani, S. Li, H.-S. Choi, N. Malmstadt, A. M. Armani, The Univ. of Southern California (United States)
- 8103 OF Photodegradation of melanin thin films by UV lithography [8103-14] C. W. Farley, A. Kassu, A. Sharma, Alabama A&M Univ. (United States)

#### SESSION 5 MULTIFUNCTIONAL MATERIALS IV

- Studies of charge transport in DNA films using the time-of-flight (TOF) technique (Keynote Paper) [8103-16]
   P. P. Yaney, Univ. of Dayton (United States); T. Gorman, Univ. of Dayton (United States) and Air Force Research Lab. (United States); F. Ouchen, J. G. Grote, Air Force Research Lab. (United States)
- Bio-dielectrics based on DNA-Ceramic hybrid films for potential energy storage applications [8103-19]
  N. Venkat, F. Ouchen, Univ. of Dayton Research Institute (United States); K. M. Singh, Air Force Research Lab. (United States); S. R. Smith, Univ. of Dayton Research Institute (United States); D. M. Joyce, Air Force Research Lab. (United States); T. Miller, UES, Inc. (United States); P. P. Yaney, Univ. of Dayton (United States); J. G. Grote, R. R. Naik, Air Force Research Lab. (United States)

#### SESSION 6 DNA PHOTONICS

- 8103 OL
   Origin of dielectric tunability in DNA-CTMA film at microwave frequencies [8103-20]
   R. S. Aga, Jr., General Dynamics Information Technology (United States) and Air Force
   Research Lab. (United States); C. M. Bartsch, Air Force Research Lab. (United States);
   B. A. Telek, G. Subramanyam, Univ. of Dayton (United States); E. M. Heckman, J. G. Grote, Air
   Force Research Lab. (United States)
- 8103 0N Two-photon absorbing chromophores for photodynamic therapy: molecular engineering and in vivo applications (Invited Paper) [8103-22]
   C. Monnereau, T. Gallavardin, C. Armagnat, P.-H. Lanoé, O. Maury, Ecole Normale Supérieure de Lyon, CNRS, Univ. de Lyon (France); S. Marotte, Y. Leverrier, INSERM, Univ. de Lyon (France); P. L. Baldeck, Lab. de Spectrométrie Physique, CNRS, Univ. Joseph Fourier (France); C. Andraud, Ecole Normale Supérieure de Lyon, CNRS, Univ. de Lyon (France)
- All optical switching in a photochromic dye-doped biopolymeric matrix (Invited Paper) [8103-23]
   J. Mysliwiec, A. Malak, J. Sikora, A. Miniewicz, Wroclaw Univ. of Technology (Poland);
   B. Sahraoui, Univ. d'Angers (France); I. Rau, Polytechnical Univ. of Bucharest (Romania);
  - F. Kajzar, Univ. d'Angers (France) and Polytechnical Univ. of Bucharest (Romania)

#### 8103 OP **Tunable dye lasers based on DNA-surfactant-dye complexes** [8103-24] T. Chida, Y. Kawabe, Chitose Institute of Science and Technology (Japan)

Author Index

### **Conference Committee**

#### Symposium Chairs

**David L. Andrews**, University of East Anglia Norwich (United Kingdom) **James G. Grote**, Air Force Research Laboratory (United States)

#### **Conference** Chairs

Norihisa Kobayashi, Chiba University (Japan) Fahima Ouchen, Air Force Research Laboratory (United States) Ileana Rau, Polytechnical Univ. of Bucharest (Romania)

#### Program Committee

Carrie M. Bartsch, Air Force Research Laboratory (United States) Liming Dai, Case Western Reserve University (United States) Raluca Dinu, GigOptix, Inc. (United States) Ananth Dodabalapur, The University of Texas at Austin (United States) James G. Grote, Air Force Research Laboratory (United States) Emily M. Heckman, Air Force Research Laboratory (United States) F. Kenneth Hopkins, Air Force Research Laboratory (United States) Kuniharu Ijiro, Hokkaido University (Japan) Jung-II Jin, Korea University (Korea, Republic of) François Kajzar, Université d'Angers (France) Sang Nyon Kim, Air Force Research Laboratory (United States) Oksana Krupka, Université d'Angers (France) Charles Y. C. Lee, Air Force Office of Scientific Research (United States) Misoon Mah, Asian Office of Aerospace Research and Development (Japan) Naoya Ogata, Chitose Institute of Science and Technology (Japan) Bruce H. Robinson, University of Washington (United States) **Anna Samoc**, The Australian National University (Australia) Marek J. Samoc, Wroclaw University of Technology (Poland) Niyazi Serdar Sariciftci, Johannes Kepler Universität Linz (Austria) **Devanand K. Shenoy**, Defense Advanced Research Projects Agency (United States) Kristi M. Singh, Air Force Research Laboratory (United States) Andrew J. Steckl, University of Cincinnati (United States) Attila A. Szep, Air Force Research Laboratory (United States) Morley O. Stone, Air Force Research Laboratory (United States) Perry P. Yaney, University of Dayton (United States) Roberto Zamboni, Consiglio Nazionale delle Ricerche (Italy)

#### Session Chairs

- DNA Applications Ileana Rau, Polytechnical Univ. of Bucharest (Romania)
   Multifunctional Materials I Fahima Ouchen, Air Force Research Laboratory (United States)
   Multifunctional Materials II Antoni C. Mitus, Wroclaw University of Technology (Poland)
   Multifunctional Materials III Kenji Mizoguchi, Tokyo Metropolitan University (Japan)
   Multifunctional Materials IV Kwang-Sup Lee, Hannam University (Korea, Republic of)
- 6 DNA Photonics Norihisa Kobayashi, Chiba University (Japan)