

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING
Vol. 13, No. 41

Nanosystems in Engineering and Medicine

Sang H. Choi
Jin-Ho Choy
Uhn Lee
Vijay K. Varadan
Editors

10–12 September 2012
Incheon, Republic of Korea

Sponsored and Published by
SPIE

Volume 8548

Proceedings of SPIE, 1605-7422, v. 8548

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

Nanosystems in Engineering and Medicine, edited by Sang H. Choi, Jin-Ho Choy, Uhn Lee, Vijay K. Varadan,
Proc. of SPIE Vol. 8548, 854801 · © 2012 SPIE · CCC code: 1605-742/12/\$18 · doi: 10.1117/12.2011741

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 *Nanosystems in Engineering and Medicine*, edited by Sang H. Choi, Jin-Ho Choy, Uhn Lee, Vijay K. Varadan, Proceedings of SPIE Vol. 8548 (SPIE, Bellingham, WA, 2012)
Article CID Number.

ISSN: 1605-7422

ISBN: 9780819492920

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 © 2012, 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 1605-7422/12/\$18.00.

Printed in the United States of America.

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



SPIEDigitalLibrary.org

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

- xi Conference Committee
xxv Sponsors

Track A: Nanomaterials and Drug Delivery

NANOMEDICINE II

- 8548 0D **Advanced biohybrid materials based on nanoclays for biomedical applications (Keynote Paper) [8548-52]**
E. Ruiz-Hitzky, M. Darder, B. Wicklein, F. M. Fernandes, F. A. Castro-Smirnov, Instituto de Ciencia de Materiales de Madrid (Spain); M. A. Martín del Burgo, G. del Real, Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (Spain); P. Aranda, Instituto de Ciencia de Materiales de Madrid (Spain)
- 8548 0E **Multifunctional superparamagnetic nanoparticles for enhanced drug transport in cystic fibrosis [8548-9]**
L. M. Armijo, Y. I. Brandt, A. C. Rivera, N. C. Cook, J. B. Plumley, N. J. Withers, M. Kopciuch, G. A. Smolyakov, The Univ. of New Mexico (United States); D. L. Huber, Sandia National Labs. (United States); H. D. C. Smyth, The Univ. of Texas at Austin (United States); M. Osiński, The Univ. of New Mexico (United States)

NANOMEDICINE III

- 8548 0I **Coloring brain tumor with multi-potent micellar nanoscale drug delivery system [8548-13]**
K. Chong, K. Choi, E. S. Kim, E. C. Han, J. Lee, J. Cha, T. Ku, J. Yoon, J.-H. Park, C. Choi, KAIST (Korea, Republic of)

NANOPHARMACEUTICALS, DRUG DELIVERY I

- 8548 0M **Magnetic iron oxide and the effect of grafting on the magnetic properties (Keynote Paper) [8548-17]**
L. T. Phuoc, J. Jouhannaud, G. Pourroy, Institut de Physique et Chimie des Matériaux de Strasbourg, CNRS, Univ. de Strasbourg (France)

NANOPHARMACEUTICALS, DRUG DELIVERY II

- 8548 0R **Two-photon imaging and diagnostics using ultrasmall diagnostic probes engineered from semiconductor nanocrystals and single-domain antibodies** [8548-22]
H. Hafian, Univ. de Reims Champagne-Ardenne (France); A. Sukhanova, Trinity College Dublin (Ireland) and Moscow Engineering Physics Institute (Russian Federation); P. Charnes, D. Baty, INSERM (France), Institut Paoli-Calmettes (France), Aix Marseille Univ., and CNRS (France); M. Plout, J. H. M. Cohen, Univ. de Reims Champagne-Ardenne (France); I. Nabiev, Trinity College Dublin (Ireland) and Moscow Engineering Physics Institute (Russian Federation); J.-M. Millot, Univ. de Reims Champagne-Ardenne (France)
- 8548 0V **Semiconductor quantum dots affect fluidity of purple membrane from *Halobacterium salinarum* through disruption of bacteriorhodopsin trimer organization.** [8548-25]
N. Bouchonville, M. Molinari, A. Le Cigne, M. Troyon, Univ. de Reims Champagne-Ardenne (France); A. Sukhanova, I. R. Nabiev, Moscow Engineering Physics Institute (Russian Federation) and Trinity College Dublin (Ireland)

NOVEL NANOMATERIALS AND INTEGRATION TECHNOLOGIES II

- 8548 1C **Printable thermoelectric devices and conductive patterns for medical applications** [8548-42]
J. Lee, Univ. of Arkansas (United States); H. J. Kim, National Institute of Aerospace (United States); L. Chen, Univ. of Arkansas (United States); S. H. Choi, NASA Langley Research Ctr. (United States); V. K. Varadan, Univ. of Arkansas (United States)
- 8548 1D **Synthesis and characterization of cellulose-functionalized 3,4-dihydroxyphenylalanine(dopamine)/silica-gold nanomaterials by sol-gel process** [8548-44]
S. Ramesh, J.-H. Kim, Chosun Univ. (Korea, Republic of)

NOVEL NANOMATERIALS AND INTEGRATION TECHNOLOGIES III

- 8548 1G **Wireless glucose monitoring watch enabled by an implantable self-sustaining glucose sensor system** [8548-48]
P. Rai, V. K. Varadan, Univ. of Arkansas (United States)

Track B: Diagnostics and Sensors

GLUCOSE, PROTEIN-BASED POWER SOURCES

- 8548 1O **Nanocomposite electrodes for smartphone enabled healthcare garments: e-bra and smart vest** [8548-55]
P. S. Kumar, Univ. of Arkansas (United States); P. Rai, The Pennsylvania State Univ. (United States); S. Oh, H. Kwon, Univ. of Arkansas (United States); V. K. Varadan, Univ. of Arkansas (United States), The Pennsylvania State Univ. (United States), and Global Institute of Nanotechnology in Engineering and Medicine Inc. (United States)

- 8548 1Q **A nanofluidic bioarray chip for fast and high-throughput detection of antibodies in biological fluids** [8548-58]

J. Lee, N. Gulzar, J. K. Scott, P. C. H. Li, Simon Fraser Univ. (Canada)

NANOENGINEERING SYSTEMS FOR MEDICAL DIAGNOSTICS AND THERAPEUTICS I

- 8548 22 **Carbon nanotube-polymer nanoparticles inks for healthcare textile** [8548-72]

P. Rai, J. Lee, Univ. of Arkansas (United States); G. N. Mathur, V. K. Varadan, Univ. of Arkansas (United States) and Global Institute of Nanotechnology (United States)

NANOENGINEERING SYSTEMS FOR MEDICAL DIAGNOSTICS AND THERAPEUTICS II

- 8548 23 **Histology-directed MALDI mass spectrometry for the diagnostic pathology (Keynote Paper)** [8548-73]

H. K. Kim, I.-H. Kim, National Cancer Ctr. (Korea, Republic of)

- 8548 27 **Bio-microinstrumentation technology: discrete components to modular systems (Keynote Paper)** [8548-77]

B. L. Gray, Simon Fraser Univ. (Canada)

NANOENGINEERING SYSTEMS FOR MEDICAL DIAGNOSTICS AND THERAPEUTICS IV

- 8548 2E **Gd chelated PANI nanoparticles for combined MR imaging and NIR photothermal cancer therapy** [8548-83]

T. Lee, D. Bang, J.-S. Suh, Y.-M. Huh, S. Haam, Yonsei Univ. (Korea, Republic of)

- 8548 2H **Luminescence/magnetic resonance imaging and photodynamic therapy based on upconverting nanoparticles** [8548-208]

Y. I. Park, Seoul National University (Korea, Republic of); H. M. Kim, Korea Research Institute of Chemical Technology (Korea, Republic of); J.-H. Kim, Seoul National University (Korea, Republic of); K. C. Moon, Korea Univ. Ansan Hospital (Korea, Republic of); B. Yoo, Seoul National University (Korea, Republic of); K. T. Lee, Korea Research Institute of Chemical Technology (Korea, Republic of); S.-Y. Yoon, Korea Univ. Ansan Hospital (Korea, Republic of); Y. D. Suh, Korea Research Institute of Chemical Technology (Korea, Republic of); S. H. Lee, Korea University (Korea, Republic of); T. Hyun, Seoul National University (Korea, Republic of)

- 8548 2I **Manipulation of permanent magnetic polymer micro-robots: a new approach towards guided wireless capsule endoscopy** [8548-87]

D. Hilbich, A. Rahbar, A. Khosla, B. L. Gray, Simon Fraser Univ. (Canada)

NANO-, BIO-, AND INFO-TECH SENSORS AND SYSTEMS FOR POINT-OF-CARE

- 8548 2L **Wireless telemedicine systems for diagnosing sleep disorders with Zigbee star network topology** [8548-90]

S. Oh, H. Kwon, Univ. of Arkansas (United States); V. K. Varadan, Univ. of Arkansas (United States), The Pennsylvania State Univ. (United States), and Global Institute of Nanotechnology in Engineering and Medicine Inc. (United States)

TELEMEDICAL, CYBERMEDICAL, AND TRANSLATIONAL NANOSYSTEMS I

- 8548 2M **The evolution of telemedicine and nanotechnology (Keynote Paper)** [8548-91]
D. K. Park, E. Y. Young Jung, B. C. Moon, Gachon Univ. Gil Hospital (Korea, Republic of)
- 8548 2N **E-Bra system for women ECG measurement with GPRS communication, nanosensor, and motion artifact remove algorithm** [8548-92]
H. Kwon, S. Oh, P. S. Kumar, Univ. of Arkansas (United States); V. K. Varadan, Univ. of Arkansas (United States), The Pennsylvania State Univ. (United States), and Global Institute of Nanotechnology in Engineering and Medicine Inc. (United States)
- 8548 2O **Smart garments in chronic disease management: progress and challenges (Keynote Paper)** [8548-93]
A. Khosla, Simon Fraser Univ. (Canada)

TELEMEDICAL, CYBERMEDICAL, AND TRANSLATIONAL NANOSYSTEMS II

- 8548 2R **Microwave thermal radiation effects on skin tissues** [8548-96]
H. Yoon, K. D. Song, Norfolk State Univ. (United States); U. Lee, Gachon Univ. Gil Medical Ctr. (Korea, Republic of); S. H. Choi, NASA Langley Research Ctr. (United States)

TELEMEDICAL, CYBERMEDICAL, AND TRANSLATIONAL NANOSYSTEMS III

- 8548 2V **Neurobiological linkage between stress and sleep (Keynote Paper)** [8548-224]
L. D. Sanford, L. L. Wellman, Eastern Virginia Medical School (United States)
- 8548 2X **Size control of ferrimagnetic iron oxide nanocubes to achieve optimum static dephasing regime r_2 relaxivity for in vivo MRI** [8548-100]
Y. Lee, N. Lee, M. Park, Seoul National Univ. (Korea, Republic of); S.-H. Choi, Seoul National Univ. Hospital (Korea, Republic of) and Seoul National Univ. (Korea, Republic of); T. Hyeon, Seoul National Univ. (Korea, Republic of)

Track C: Nanomedicine

NANOSTRUCTURES AND NANODEVICES

- 8548 31 **Biomimetic approaches for engineered organ chips and skin electronics for in vitro diagnostics (Invited Paper)** [8548-29]
K.-Y. Suh, C. Pang, Seoul National Univ. (Korea, Republic of); K.-J. Jang, Harvard Univ. (United States); H. N. Kim, Seoul National Univ. (Korea, Republic of); A. Jiao, Univ. of Washington (United States); N. S. Hwang, M. S. Kim, D.-H. Kang, Seoul National Univ. (Korea, Republic of); D.-H. Kim, Univ. of Washington (United States)

NANOTECHNOLOGY AND STENTS II

- 8548 3M **Role of metallic stents in benign esophageal stricture (Keynote Paper) [8548-127]**
C. S. Shim, Konkuk Univ. Medical Ctr. (Korea, Republic of)

NANOTECHNOLOGY AND STENTS III

- 8548 3P **Drug-eluting stent in malignant biliary obstruction (Keynote Paper) [8548-130]**
D. K. Lee, S. I. Jang, Gangnam Severance Hospital, Yonsei Univ. (Korea, Republic of)
- 8548 3R **A portable and high energy efficient desalination/purification system by ion concentration polarization (Invited Paper) [8548-132]**
S. J. Kim, Seoul National Univ. (Korea, Republic of); B. Kim, Pohang Univ. of Science and Technology (Korea, Republic of); R. Kwak, Massachusetts Institute of Technology (United States); G. Kim, Pohang Univ. of Science and Technology (Korea, Republic of); J. Han, Massachusetts Institute of Technology (United States)

NANOTECHNOLOGY AND STENTS IV

- 8548 3S **Laminated cubic biodegradable polymer structures for bacteria-based robotic drug delivery (Invited Paper) [8548-136]**
H. J. Yoo, S. Lee, J. H. Ahn, S. Hong, M. Lee, J. M. Seo, Seoul National Univ. (Korea, Republic of); T. Y. Kim, Seoul National Univ. College of Medicine (Korea, Republic of); S. J. Kim, Seoul National Univ. (Korea, Republic of); D. Cho, Seoul National Univ. (Korea, Republic of)
- 8548 3U **New drug-eluting stents to prevent stent thrombosis and restenosis for acute myocardial infarction: from the experience of Korean acute myocardial infarction registry (Keynote Paper) [8548-125]**
I.-H. Bae, Heart Research Ctr., Korea Ministry of Health and Welfare (Korea, Republic of) and Korea Cardiovascular Stent Research Institute (Korea, Republic of); M. H. Jeong, Heart Research Ctr., Korea Ministry of Health and Welfare (Korea, Republic of), Korea Cardiovascular Stent Research Institute (Korea, Republic of), Korean Acute Myocardial Infarction Registry (Korea, Republic of), and Chonnam National Univ. Hospital (Korea, Republic of)

BIO- AND BRAIN ENGINEERING I

- 8548 3Y **Optogenetic mapping of brain circuitry (Keynote Paper) [8548-244]**
G. J. Augustine, Duke-NUS Medical School (Singapore) and Korea Institute of Science and Technology (Korea, Republic of); K. Berglund, Duke Univ. School of Medicine (United States); H. Gill, C. Hoffmann, M. Katarya, J. Kim, Duke-NUS Medical School (Singapore); J. Kudolo, Korea Institute of Science and Technology (Korea, Republic of); L. M. Lee, Duke-NUS Medical School (Singapore); M. Lee, Korea Institute of Science and Technology (Korea, Republic of); D. Lo, Duke-NUS Medical School (Singapore); R. Nakajima, M. Y. Park, Korea Institute of Science and Technology (Korea, Republic of); G. Tan, Y. Tang, P. Teo, S. Tsuda, Duke-NUS Medical School (Singapore); L. Wen, Korea Institute of Science and Technology (Korea, Republic of); S.-I. Yoon, Duke-NUS Medical School (Singapore)

BIO- AND BRAIN ENGINEERING II

- 8548 3Z **Resting state brain networks and their implications in neurodegenerative disease (Invited Paper) [8548-139]**
W. S. Sohn, K. Yoo, J. Kim, Y. Jeong, KAIST (Korea, Republic of)
- 8548 42 **Optogenetic tools for in vivo applications in neonatal mice (Invited Paper) [8548-148]**
Y. Zhang, Second Military Medical Univ. (China); N. Qin, Y. Diao, Fudan Univ. (China); Y. Guan, Second Military Medical Univ. (China); L. Fan, Second Military Medical Univ. (China) and Yale School of Medicine (United States); M. C. Crair, Yale School of Medicine (United States); J. Zhang, Fudan Univ. (China)
- 8548 43 **Nanoscale surface cues and in vitro neuronal growth (Invited Paper) [8548-149]**
Y. Nam, M. J. Jang, K. Kang, I. S. Choi, KAIST (Korea, Republic of)

PHOTODYNAMIC I

- 8548 44 **Micro-/nano- robotic manipulation and biomedical applications (Keynote Paper) [8548-143]**
F. Arai, Nagoya Univ. (Japan)
- 8548 45 **Tracing and quantification of pharmaceuticals using MR imaging and spectroscopy at clinical MRI system (Keynote Paper) [8548-144]**
E.-K. Jeong, Utah Ctr. for Advanced Imaging Research (United States) and The Univ. of Utah (United States); X. Liu, Univ. of California, San Francisco (United States); X. Shi, The Univ. of Utah (United States); Y.-B. Yu, Univ. of Maryland, Baltimore (United States); Z.-R. Lu, Case Western Reserve Univ. (United States)

PHOTODYNAMIC II

- 8548 46 **Magnetic resonance imaging using chemical exchange saturation transfer (Keynote Paper) [8548-145]**
J. Park, Korea Univ. (Korea, Republic of)

Poster Session

- 8548 49 **Properties of herbal extracts against *Propionibacterium acnes* for biomedical application [8548-45]**
Y.-M. Lim, Korea Atomic Energy Research Institute (Korea, Republic of); S. E. Kim, Korea Univ. College of Medicine (Korea, Republic of); Y.-S. Kim, Y. M. Shin, S. I. Jeong, S.-Y. Jo, H.-J. Gwon, J.-S. Park, Y.-C. Nho, Korea Atomic Energy Research Institute (Korea, Republic of); J.-C. Kim, S.-J. Kim, GENIC Co. (Korea, Republic of); H. Shin, Hanyang Univ. (Korea, Republic of)

- 8548 4A **A portable microfluidic chip system for cancer diagnosis with simultaneous detection methods** [8548-102]
H. Choi, K. B. Kim, C. Jun, T. D. Chung, Seoul National Univ. (Korea, Republic of); H. C. Kim, Seoul National Univ. College of Medicine (Korea, Republic of) and Seoul National Univ. Medical Research Ctr. (Korea, Republic of)
- 8548 4G **Synthesis of hybrid organic-inorganic near-IR responsive magnetic nanoparticles for cancer theragnosis** [8548-156]
D. Bang, T. Lee, J. Choi, J. Park, B. Kang, Yonsei Univ. (Korea, Republic of); Y.-M. Huh, Yonsei Univ. College of Medicine (Korea, Republic of); S. Haam, Yonsei Univ. (Korea, Republic of)
- 8548 4K **Magnetic resonance imaging of glioblastoma using aptamer conjugated magnetic nanoparticles** [8548-160]
B. Kim, Yonsei Univ. (Korea, Republic of); J. Yang, M. Hwang, J.-S. Suh, Y.-M. Huh, Yonsei Univ. College of Medicine (Korea, Republic of); S. Haam, Yonsei Univ. (Korea, Republic of)
- 8548 5F **Quantum dots induce charge-specific amyloid-like fibrillation of insulin at physiological conditions** [8548-200]
A. Sukhanova, Trinity College Dublin (Ireland) and Moscow Engineering Physics Institute (Russian Federation); S. Poly, CIC nanoGUNE Consolider (Spain); A. Shemetov, Moscow Engineering Physics Institute (Russian Federation); I. Nabiev, Trinity College Dublin (Ireland) and Moscow Engineering Physics Institute (Russian Federation)
- 8548 5X **Electrooxidation of saccharides at platinum electrode** [8548-220]
J.-H. Han, T.-D. Chung, Seoul National Univ. (Korea, Republic of)
- 8548 67 **Synthesis of iron oxide nanotubes and their applications in neuroscience and drug delivery** [8548-234]
L. Chen, J. Xie, K. R. Aatre, Univ. of Arkansas (United States); J. Yancey, M. Srivatsan, Arkansas State Univ. (United States); V. K. Varadan, Univ. of Arkansas (United States)
- 8548 6B **The effect of an alendronate-eluting titanium system to induce osteogenic differentiation in human buccal fat cells (HBFCs)** [8548-237]
S. E. Kim, Korea Univ. College of Medicine (Korea, Republic of); S.-Y. Lee, Seoul St. Mary's Dental Hospital, The Catholic Univ. of Korea (Korea, Republic of); Y.-P. Yun, J. Y. Lee, Korea Univ. College of Medicine (Korea, Republic of); K. Park, Korea Basic Science Institute (Korea, Republic of); D.-W. Lee, Kyung Hee Univ. Dental Hospital at Gangdong (Korea, Republic of); H.-R. Song, Korea Univ. College of Medicine (United States)
- 8548 6D **Bionanocomposites based on layered double hydroxides as drug delivery systems** [8548-243]
P. Aranda, A. C. S. Alcântara, Instituto de Ciencia de Materiales de Madrid (Spain); L. N. M. Ribeiro, Instituto de Ciencia de Materiales de Madrid, CSIC (Spain) and Univ. de São Carlos (Brazil); M. Darder, E. Ruiz-Hitzky, Instituto de Ciencia de Materiales de Madrid, CSIC (Spain)
- 8548 6E **Development of intelligent theragnostic bacteria-based biomedical microrobot** [8548-240]
S. Park, S. Y. Ko, J.-O. Park, S. Park, Chonnam National Univ. (Korea, Republic of)

Author Index

Conference Committee

Symposium Chairs

Sang H. Choi, NASA Langley Research Center (United States)
Jin-Ho Choy, Ewha Womans University (Korea, Republic of)
Uhn Lee, Gachon University Gil Medical Center (Korea, Republic of)
Vijay K. Varadan, University of Arkansas (United States)

Conference Chairs

Sang H. Choi, NASA Langley Research Center (United States)
Jin-Ho Choy, Ewha Womans University (Korea, Republic of)
Uhn Lee, Gachon University Gil Medical Center
(Korea, Republic of)
Vijay K. Varadan, University of Arkansas (United States)

Conference CoChairs

Jin Woo Chang, Yonsei University College of Medicine
(Korea, Republic of)
Bong Hyun Chung, Korea Research Institute of Bioscience and Biotechnology (Korea, Republic of)
Jung Hee Lee, Sungkyunkwan University School of Medicine
(Korea, Republic of)
Seung Jin Lee, Ewha Womans University (Korea, Republic of)
Dae Won Moon, Korea Research Institute of Standards and Science
(Korea, Republic of)
Dong Kyun Park, Gachon University Gil Medical Center
(Korea, Republic of)
Ki Dong Park, Ajou University (Korea, Republic of)
Jin-Suck Suh, Yonsei University College of Medicine
(Korea, Republic of)

Conference Program Committee

Sung-Min Ahn, Lee Gil Ya Cancer and Diabetes Institute
(Korea, Republic of)
Jinwoo Cheon, Yonsei University (Korea, Republic of)
Ki Baik Hahm, Gachon University Gil Medical Center
(Korea, Republic of)
Dong Keun Han, Korea Institute of Science and Technology
(Korea, Republic of)
Taeghwan Hyeon, Seoul National University (Korea, Republic of)

Soo-Bin Im, Soonchunhyang University Hospital Bucheon
(Korea, Republic of)

Byung-II Kim, Sunchon National University (Korea, Republic of)

Donghyun Kim, Yonsei University (Korea, Republic of)

Dong-Pyo Kim, Pohang University of Science and Technology
(Korea, Republic of)

Heon Young Kim, Kangwon National University (Korea, Republic of)

Meyoung-Kon Kim, Korea University College of Medicine
(Korea, Republic of)

Seon Jeong Kim, Hanyang University (Korea, Republic of)

Young-Bo Kim, Gachon University Gil Medical Center
(Korea, Republic of)

Young Soo Kim, Hanyang University (Korea, Republic of)

Yun-Hee Kim, Sungkyunkwan University School of Medicine
(Korea, Republic of)

Gu Kong, Hanyang University School of Medicine (Korea, Republic of)

Ick Chan Kwon, Korea Institute of Science and Technology
(Korea, Republic of)

Eun Sook Lee, Medical Cancer Center (Korea, Republic of)

Jung Il Lee, Korea Institute of Science and Technology
(Korea, Republic of)

Kyeong-jin Lee, The Catholic University of Korea (Korea, Republic of)

SangHoon Lee, Korea University (Korea, Republic of)

Sun Ha Paek, Seoul National University Hospital (Korea, Republic of)

Jong-Oh Park, Chonnam National University (Korea, Republic of)

Jung Yul Park, Korea University (Korea, Republic of)

Jae Choen Ryu, Korea Institute of Science and Technology
(Korea, Republic of)

Young Hoon Ryu, Yonsei University College of Medicine
(Korea, Republic of)

Eak Kyun Shin, Gachon University Gil Medical Center
(Korea, Republic of)

Byung-Chul Son, The Catholic University of Korea (Korea, Republic of)

Hae Ryong Song, Korea University College of Medicine
(Korea, Republic of)

Yoon-Kyu Song, Seoul National University (Korea, Republic of)

Sung Yang, Gwangju Institute of Science and Technology
(Korea, Republic of)

Kyung Byung Yoon, Sogang University (Korea, Republic of)

Chae-Ok Yun, Yonsei University (Korea, Republic of)

Wan Soo Yun, Sungkyunkwan University (Korea, Republic of)

Session Chairs

Plenary I

Ki Dong Park, Ajou University (Korea, Republic of)

Plenary II

Dae Won Moon, Korea Research Institute of Standards and Science
(Korea, Republic of)

Plenary III

Taeghwan Hyeon, Seoul National University (Korea, Republic of)

Plenary IV

Taek Dong Chung, Seoul National University (Korea, Republic of)

Plenary V

Jinwoo Cheon, Yonsei University (Korea, Republic of)

TRACK A Nanomaterials and Drug Delivery

1a

Nanomedicine I

Chae-Ok Yun, Yonsei University (Korea, Republic of)

2a

Nanomedicine II

Ram I. Mahato, The University of Tennessee Health Science Center
(United States)

3a

Nanomedicine III

Won Jong Kim, Pohang University of Science and Technology
(Korea, Republic of)

4a

Nanopharmaceuticals, Drug Delivery I

Kohei Soga, Tokyo University of Science (Japan)

5a

Nanopharmaceuticals, Drug Delivery II

Geneviève Pourroy, Institut de Physique et Chimie des Matériaux de
Strasbourg (France)

6a

Nano-and Microfluidics I

Qun Fang, Zhejiang University (China)

7a

Nano-and Microfluidics II

Jianhua Qin, Dalian Institute of Chemical Physics (China)

8a

Novel Nanomaterials and Integration Technologies I

Lennart Bergström, Stockholm University (Sweden)

- 9a Novel Nanomaterials and Integration Technologies II
Youn Soo Sohn, Ewha Womans University (Korea, Republic of)
- 10a Novel Nanomaterials and Integration Technologies III
Kyung Byung Yoon, Sogang University (Korea, Republic of)
- 11a Novel Nanomaterials and Integration Technologies IV
Nam Woong Song, Korea Research Institute of Standards and Science (Korea, Republic of)

TRACK B Diagnostics and Sensors

- 1b Glucose, Protein-Based Power Sources
Wan Soo Yun, Sungkyunkwan University (Korea, Republic of)
- 2b Nanosensors and Integrated Wireless System for Medical Diagnostics I
Matsuhiko Nishizawa, Tohoku University (Japan)
- 3b Nanosensors and Integrated Wireless System for Medical Diagnostics II
Yukio Nagasaki, University of Tsukuba (Japan)
Ick Chan Kwon, Korea Institute of Science and Technology (Korea, Republic of)
- 4b Nanoengineering Systems for Medical Diagnostics and Therapeutics I
In-Hoo Kim, National Cancer Center (Korea, Republic of)
- 5b Nanoengineering Systems for Medical Diagnostics and Therapeutics II
Dae Won Moon, Korea Research Institute of Standards and Science (Korea, Republic of)
- 6b Nanoengineering Systems for Medical Diagnostics and Therapeutics III
In Hoo Kim, National Cancer Center (Korea, Republic of)
- 7b Nanoengineering Systems for Medical Diagnostics and Therapeutics IV
Miqin Zhang, University of Washington (United States)
- 8b Nano-, Bio-, and Info-Tech Sensors and Systems for Point-of-Care
Dong Kyun Park, Gachon University Gil Medical Center (Korea, Republic of)
- 9b Telemedical, Cybermedical, and Translational Nanosystems I
Joshua Edel, Imperial College London (United Kingdom)

- 10b Telemedical, Cybermedical, and Translational Nanosystems II
Taek Dong Chung, Seoul National University (Korea, Republic of)
- 11b Telemedical, Cybermedical, and Translational Nanosystems III
Hargsoon Yoon, Norfolk State University (United States)

TRACK C Nanostructures and Nanodevices

- 1c Nanostructures and Nanodevices
SangHoon Lee, Korea University (Korea, Republic of)
- 2c Medical Imaging, Microspectrometers I
Keon Wook Kang, Seoul National University (Korea, Republic of)
- 3c Medical Imaging, Microspectrometers II
Kyongtae Ty Bae, University of Pittsburgh Medical Center
 (United States)
Donghyun Kim, Yonsei University (Korea, Republic of)
- 4c Medical imaging, Microspectrometers III
Donghyun Kim, Yonsei University (Korea, Republic of)
- 5c Nanotechnology and Stents I
Yoon Ki Joung, Korea Institute of Science and Technology
 (Korea, Republic of)
- 6c Nanotechnology and Stents II
Dong Keun Han, Korea Institute of Science and Technology
 (Korea, Republic of)
- 7c Nanotechnology and Stents III
Ki Dong Park, Ajou University (Korea, Republic of)
Don Hang Lee, Inha Medical School (Korea, Republic of)
- 8c Nanotechnology and Stents IV
Myung Ho Jeong, Chonnam National University Hospital
 (Korea, Republic of)
Beop-Min Kim, Korea University (Korea, Republic of)
- 9c Bio- and Brain Engineering I
Yoon-Kyu Song, Seoul National University (Korea, Republic of)
- 10c Bio- and Brain Engineering II
Jin Woo Chang, Yonsei University College of Medicine
 (Korea, Republic of)
Yoon-Kyu Song, Seoul National University (Korea, Republic of)

- 11c Photodynamic I
Jinwoo Cheon, Yonsei University (Korea, Republic of)
- 12c Photodynamic II
Eun-Kee Jeong, University of Utah (United States)
Jaeseok Park, SAMSUNG SDI Co., LTD. (Korea, Republic of)

Sponsors

The organizers thank the following sponsors for their generous support

Gold Sponsors



Silver Sponsor



Bronze Sponsor



Additional Sponsors

Bukwang Pharm. Co., Ltd.
CJ Cheiljedang Pharm.
Dong-A Pharm. Co. Ltd.
DongBang Healthcare Products
Co., Ltd.

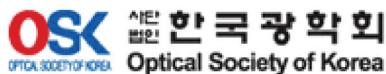
GSK
Han Wha Pharm. Co., Ltd.
Ildong Pharm. Co., Ltd.
Janssen Korea Ltd.
Jeil Pharm. Co., Ltd.

Korean Drug Co., Ltd.
Medtronic Korea
MSD Korea Ltd.
Samjin Pharm. Co., Ltd.
Seinmedex Co.

Supported By



Cooperating Organization



Sponsor



