

PROCEEDINGS OF SPIE

Fourth International Conference on Smart Materials and Nanotechnology in Engineering

Jayantha A. Epaarachchi
Alan Kin-tak Lau
Jinsong Leng
Editors

10–12 July 2013
Gold Coast, Australia

Organized by
University of Southern Queensland (Australia)
The Hong Kong Polytechnic University (Hong Kong, China)
Harbin Institute of Technology (China)

Sponsored by
Australian Nanotechnology Network • Bestech Australia Pty. Ltd. (Australia) • Boeing Research and Technology Australia • Centre of Excellence in Engineered Fibre Composites, University of Southern Queensland (Australia) • Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, Australian Government • Engineers Australia • Lastek Pty. Ltd. (Australia) • Materials Australia • Queensland Government • University of Southern Queensland (Australia)

Published by
SPIE

Volume 8793

Proceedings of SPIE 0277-786X, V. 8793

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

Fourth International Conference on Smart Materials and Nanotechnology in Engineering,
edited by Jayantha A. Epaarachchi, Alan Kin-tak Lau, Jinsong Leng, Proc. of SPIE Vol. 8793,
879301 · © 2013 SPIE · CCC code: 0277-786X/13/\$18 · doi: 10.1117/12.2036624

Proc. of SPIE Vol. 8793 879301-1

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.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Fourth International Conference on Smart Materials and Nanotechnology in Engineering*, edited by Jayantha A. Epaarachchi, Alan Kin-tak Lau, Jinsong Leng, Proceedings of SPIE Vol. 8793 (SPIE, Bellingham, WA, 2013) Article CID Number.

ISSN: 0277-786X

ISBN: 9780819496300

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 © 2013, 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/13/\$18.00.

Printed in the United States of America.

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



SPIDigitalLibrary.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
xv Introduction

SESSION 1 NANOMATERIALS FOR BIOENGINEERING

- 8793 02 **A novel epoxy/electrospun PLA nanofibre composite material: fabrication and characterisation** [8793-13]
Y. Dong, T. Mosaval, H. J. Haroosh, Curtin Univ. (Australia)
- 8793 03 **Mechanical, thermal, and biodegradable properties of polylactic acid (PLA)/coir fibre biocomposites** [8793-53]
Y. Dong, A. Ghataura, H. J. Haroosh, Curtin Univ. (Australia)
- 8793 04 **A novel drug carrier based on functional modified nanofiber cellulose and the control release behavior** [8793-68]
X. Shi, Y. Zheng, W. Zhang, Z. Zhang, Y. Peng, Univ. of Science and Technology Beijing (China)
- 8793 05 **Integration of textile fabric and coconut shell in particleboard** [8793-84]
M. I. Mison, Univ. of Southern Queensland (Australia) and Univ. Teknologi MARA (Malaysia); S. A. Bahari, Univ. Teknologi MARA (Malaysia); M. M. Islam, J. A. Epaarachchi, Univ. of Southern Queensland (Australia)
- 8793 06 **Non-invasive medical diagnostics by nanoparticle-based solid-state gas sensors** [8793-125]
A. Tricoli, The Australian National Univ. (Australia)
- 8793 07 **Improving the physical properties crunchiness of potato crisps by pretreatment techniques and vacuum frying** [8793-131]
M. T. T. Tran, The Univ. of Auckland (New Zealand); X. D. Chen, Soochow Univ. (China)

SESSION 2 SMART MATERIALS AND STRUCTURES

- 8793 08 **Sensors based on SAW and FBAR technologies** [8793-6]
L. García-Gancedo, Univ. of Cambridge (United Kingdom); W. I. Milne, Univ. of Cambridge (United Kingdom) and Kyung Hee Univ. (Korea, Republic of); J. K. Luo, Univ. of Bolton (United Kingdom); A. J. Flewitt, Univ. of Cambridge (United Kingdom)
- 8793 09 **Effect of surface modification of lead zirconate titanate particles on the properties of piezoelectric composite sensors** [8793-10]
N. Saber, J. Ma, H.-Y. Hsu, S.-H. Lee, Univ. of South Australia (Australia); D. Marney, Commonwealth Scientific and Industrial Research Organisation (Australia)

- 8793 0A **A three-dimensional ultrasonic anemometer for indoor environmental applications** [8793-28]
J. Sun, L. G. Loo Carbajal, G. Wei, Harbin Institute of Technology (China)
- 8793 0B **NIR fibre Bragg grating as dynamic sensor: an application of 1D digital wavelet analysis for signal denoising** [8793-32]
Z. M. Hafizi, Univ. of Southern Queensland (Australia) and Univ. Malaysia Pahang (Malaysia); G. C. Kahandawa, J. Epaarachchi, K. T. Lau, Univ. of Southern Queensland (Australia); J. Canning, K. Cook, The Univ. of Sydney (Australia)
- 8793 0C **A new release device based on styrene-based SMP reinforced by carbon fiber** [8793-60]
H. Wei, C. Guan, H. Du, L. Liu, J. Leng, Harbin Institute of Technology (China)
- 8793 0D **Preparation and research on giant porphyrin capsule used in the detection of metal ions** [8793-75]
L. Ge, W. Wang, Z. Xu, Southeast Univ. (China)
- 8793 0E **A force compliant surgical robotic tool with IPMC actuator and integrated sensing** [8793-77]
L. Fu, A. J. McDaid, K. C. Aw, The Univ. of Auckland (New Zealand)
- 8793 0F **Smart structure for small wind turbine blade** [8793-78]
E. E. Supeni, Univ. Putra Malaysia (Malaysia); J. A. Epaarachchi, M. M. Islam, Univ. of Southern Queensland (Australia); K. T. Lau, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 8793 0G **Effect of the location and size of a single crack on first fundamental frequency of a cantilever beam using fiber optic polarimetric sensors and characterisation of FBG sensors** [8793-79]
M. Maheshwari, A. K. Asundi, S. C. Tjin, Nanyang Technological Univ. (Singapore)
- 8793 0H **Exploratory study on sulfate attack monitoring of concrete structures using piezoceramic based smart aggregates** [8793-81]
D. Zou, Tsinghua Univ. (China); T. Liu, Y. Huang, Harbin Institute of Technology (China); B. Li, Tsinghua Univ. (China); J. Teng, Harbin Institute of Technology (China)
- 8793 0I **Micro CVD diamond heat sink** [8793-98]
W. Lu, G. Ai, Nanjing Univ. of Aeronautics and Astronautics (China) and Jiangsu Key Lab. of Precision and Micro-Manufacturing Technology (China); P. Li, Nanjing Univ. of Posts and Telecommunications (China); Y. Sun, D. Zhang, D. Zuo, Nanjing Univ. of Aeronautics and Astronautics (China)
- 8793 0J **Exploring the room temperature self-assembly of silica nanoparticle layers on optical fibres** [8793-101]
J. Canning, L. Lindoy, G. Huyang, M. Naqshbandi, K. Cook, M. J. Crossley, The Univ. of Sydney (Australia); Y. Luo, G.-D. Peng, The Univ. of New South Wales (Australia); L. Glavind, M. Kristensen, Aarhus Univ. (Denmark)
- 8793 0K **Indexing damage using distortion of embedded FBG sensor response spectra** [8793-110]
G. C. Kahandawa, J. A. Epaarachchi, Univ. of Southern Queensland (Australia); K. T. Lau, The Hong Kong Polytechnic Univ. (Hong Kong, China)

- 8793 OL **Embedded fibre optic sensors under multi-axial loading: a pilot study** [8793-116]
J. Peauril, J. Epaarachchi, K. T. Lau, H. Wang, Univ. of Southern Queensland (Australia)
- 8793 OM **Use of nanoclay to improve the fire performance of glass fibre composites** [8793-117]
Q. Nguyen, T. Ngo, The Univ. of Melbourne (Australia); K. Moinuddin, Victoria Univ. (Australia); P. Mendis, The Univ. of Melbourne (Australia)
- 8793 ON **Flapping metal actuator in electric field** [8793-119]
C. Xu, C. Xu, J. Zheng, Univ. of Science and Technology of China (China)
- 8793 OO **The response of high-temperature optical fiber sensor applied to different materials** [8793-137]
C. Du, W. Xie, S. Huo, S. Meng, K. Xu, L. Jiao, Harbin Institute of Technology (China)
- 8793 OP **Fabrication of a label-free plasmon immunosensor based on triangular silver nanoplates** [8793-163]
P. Dong, Y. Lin, J. Di, Soochow Univ. (China)
- 8793 OQ **Ultrasonic monitoring of asymmetric carbon fibre reinforced aluminum laminates** [8793-167]
J. Zhao, F. Yang, R. Wang, Harbin Institute of Technology (China)
- 8793 OR **Design of smart functional apparel products for moxa moxibustion** [8793-168]
L. Li, W. Au, F. Ding, The Hong Kong Polytechnic Univ. (Hong Kong, China); K. Wong, Tung Wah College (Hong Kong, China)

SESSION 3 CARBON NANOTUBES AND THEIR APPLICATION

- 8793 OS **A facile approach to fabricate elastomer/graphene platelets nanocomposites** [8793-9]
S. Araby, Univ. of South Australia (Australia) and Benha Univ. (Egypt); A. Maged, Benha Univ. (Egypt); I. Zaman, Univ. Tun Hussein Onn Malaysia (Malaysia); J. Ma, P. Majewski, Univ. of South Australia (Australia)
- 8793 OT **Carbon nanotube based nanostructured thin films: preparation and application** [8793-20]
L. Fu, A. Yu, Swinburne Univ. of Technology (Australia)
- 8793 OU **Fabrication and characterisation of graphene oxide-epoxy nanocomposite (Invited Paper)** [8793-45]
D. Galpaya, M. Wang, C. Yan, Queensland Univ. of Technology (Australia); M. Liu, Suzhou Institute of Nano-Tech and Nano-Bionics (China); N. Motta, E. Waclawik, Queensland Univ. of Technology (Australia)
- 8793 OV **CNT-cement based composites: fabrication, self-sensing properties, and prospective applications to structural health monitoring** [8793-74]
C. Rainieri, Univ. of Molise (Italy); Y. Song, Univ. of Cincinnati (United States); G. Fabbrocino, Univ. of Molise (Italy); M. J. Schulz, V. Shanov, Univ. of Cincinnati (United States)
- 8793 OW **Ultralong, aligned, and uniform single-walled carbon nanotubes-based nanodevices for advanced applications** [8793-90]
J. An, L. Zheng, Nanyang Technological Univ. (Singapore)

- 8793 0X **Multifunctional carbon nano-paper composite** [8793-139]
Z. Zhang, H. Chu, K. Wang, Y. Liu, J. Leng, Harbin Institute of Technology (China)
- 8793 0Y **Confinement of C₆₀ nanoparticles on the dynamics of polystyrene studied by anelastic spectroscopy and rheometrics** [8793-142]
Z. Fang, S. Shang, Zhejiang Univ. (China); H. Wang, Univ. of Southern Queensland (Australia)

SESSION 4 RENEWABLE MATERIALS AND TECHNOLOGIES

- 8793 0Z **Effects of TiCl₄ treatment on the performance of CdSe/CdS-sensitised solar cells** [8793-31]
R. Ahmed, J. Bell, H. Wang, Queensland Univ. of Technology (Australia)
- 8793 10 **Inorganic polymer foams: transform from non-structural to structural upon fire** [8793-82]
Z. Zhang, Univ. of Southern Queensland (Australia); T. Yang, Nanjing Univ. of Technology (China); H. Wang, Univ. of Southern Queensland (Australia); X. Yao, Nanjing Univ. of Technology (China)
- 8793 11 **Preliminary study on the development of syntactic foams for marine applications** [8793-135]
Z. Salleh, Univ. of Southern Queensland (Australia) and Univ. Kuala Lumpur (Malaysia); M. M. Islam, H. Ku, Univ. of Southern Queensland (Australia)
- 8793 12 **Experimental development and control of magnetorheological damper towards smart energy absorption of composite structures** [8793-146]
S. H. Lim, B. G. Prusty, A. Lee, G. H. Yeoh, The Univ. of New South Wales (Australia)
- 8793 13 **Alkali-aggregate reactivity of typical siliceous glass and carbonate rocks in alkali-activated fly ash based geopolymers** [8793-166]
D. Lu, Y. Liu, Y. Zheng, Z. Xu, X. Shen, Nanjing Univ. of Technology (China)

SESSION 5 ELECTRO-ACTIVE POLYMERS

- 8793 14 **Silver nanowire dopant enhancing piezoelectricity of electrospun PVDF nanofiber web (Invited Paper)** [8793-44]
B. Li, J. Zheng, C. Xu, Univ. of Science and Technology of China (China)
- 8793 15 **Influence of the ultraviolet irradiation on the properties of TiO₂-polystyrene shape memory nanocomposites** [8793-92]
W. Wang, Y. Liu, J. Leng, Harbin Institute of Technology (China)
- 8793 16 **Investigation of the effect of magnetic field on ferrofluid in microelectromechanical devices (MEMS)** [8793-147]
A. Lee, The Univ. of New South Wales (Australia); G. H. Yeoh, The Univ. of New South Wales (Australia) and Australian Nuclear Science and Technology Organisation (Australia); S. H. Lim, B. G. Prusty, The Univ. of New South Wales (Australia)

- 8793 17 **Numerical modeling of dielectrics electrocaloric effect near the ferroelectric-paraelectric phase transformation** [8793-157]
Y. Wang, L. Liu, Y. Liu, J. Leng, Harbin Institute of Technology (China)

SESSION 6 AEROSPACE COMPOSITES

- 8793 18 **Thermo-responsive PNIPAM nanofibres crosslinked by OpePOSS** [8793-5]
J. Wang, C. Hurren, A. Sutti, T. Lin, X. Wang, Deakin Univ. (Australia)
- 8793 19 **Effect of tool design on the microstructure and microhardness of friction stir processed 5005-H34 aluminium alloy** [8793-24]
J. Mikhail, R. Ibrahim, Monash Univ. (Australia); S. Lathabai, CSIRO Process Science and Engineering (Australia)
- 8793 1A **Size control of Cu₂ZnSnS₄ (CZTS) nanocrystals in the colloidal medium synthesis** [8793-25]
A. Kulendran, J. Bell, H. Wang, Queensland Univ. of Technology (Australia)
- 8793 1B **Tensile properties of nanoclay reinforced epoxy composites** [8793-27]
H. Ku, M. Trada, Univ. of Southern Queensland (Australia)
- 8793 1C **Micromechanical study on thermo-mechanical behavior of Ti-ZrO₂ graded composites fabricated by spark plasma sintering** [8793-34]
H. Tsukamoto, Y. Komiya, H. Sato, Y. Watanabe, Nagoya Institute of Technology (Japan)
- 8793 1D **Effect of skin-core debonding on the dynamic behaviour of GFRP composite beams** [8793-40]
I. Jayatilake, K. Karunasena, W. Lokuge, Univ. of Southern Queensland (Australia)
- 8793 1E **Architecture, optical absorption, and photocurrent response of TiO₂-SrTiO₃ and TiO₂-CeO₂ nanostructured composites** [8793-46]
C.-H. Chen, J. Shieh, National Taiwan Univ. (Taiwan); J.-J. Shyue, National Taiwan Univ. (Taiwan) and Research Ctr. for Applied Sciences (Taiwan)
- 8793 1F **Damage of hybrid composite laminates** [8793-57]
H. A. Haery, H. S. Kim, The Univ. of Newcastle (Australia)
- 8793 1G **Heterogeneous porous structures for the fastest liquid absorption** [8793-69]
D. Shou, L. Ye, The Univ. of Sydney (Australia); J. Fan, Cornell Univ. (United States)
- 8793 1H **The importance of carbonisation atmosphere on char properties derived from poly(divinylbenzene)** [8793-85]
D. F. Fania, K. Kannangara, A. Milev, G. Dennis, Univ. of Western Sydney (Australia)
- 8793 1I **Size effect of SiC particle on microstructures and mechanical properties of SiCp/Al composites** [8793-115]
D. Li, Nanchang Hangkong Univ. (China) and The Australian National Univ. (Australia); Y. Yu, Nanchang Hangkong Univ. (China); Q. H. Qin, Australian National Univ. (Australia); X. Zhou, A. Zou, X. Hua, J. Zhang, W. Wu, Nanchang Hangkong Univ. (China)

- 8793 1J **Cure shrinkage in epoxy grouts for grouted repairs** [8793-122]
Md. Shamsuddoha, Univ. of Southern Queensland (Australia) and Cooperative Research Ctr. for Advanced Composite Structures (Australia); Md. M. Islam, T. Aravinthan, Univ. of Southern Queensland (Australia); A. Manalo, Univ. of Southern Queensland (Australia) and Cooperative Research Ctr. for Advanced Composite Structures (Australia); K. Lau, Univ. of Southern Queensland (Australia)

SESSION 7 MODELING AND SIMULATION

- 8793 1K **Dual field finite element simulations of piezo-patches on fabrics: a parametric study** [8793-7]
S. Waqar, J. M. McCarthy, A. Deivasigamani, C. H. Wang, L. Wang, RMIT Univ. (Australia); F. Coman, FCST Pty. (Australia); S. John, RMIT Univ. (Australia)
- 8793 1L **Fabrication of nanoporous platinum thin films for hydrogen sensing: a comparison between experimental and simulation results** [8793-16]
A. Abburi, Galgotias Univ. (India) and Univ. of Idaho (United States)
- 8793 1M **Empirical modeling of enhanced optical absorption of metallic nanohole arrays** [8793-26]
W. Yu, X. Yan, P. Li, X. Hao, Y. Mou, Beijing Institute of Technology (China); D. Li, Nanchang Hangkong Univ. (China)
- 8793 1N **A computational model for predicting the mass transport in a CVD reactor for carbon nanotube synthesis** [8793-29]
K. Raji, C. B. Sobhan, National Institute of Technology Calicut (India)
- 8793 1O **Thermal transport in graphene-polymer nanocomposites** [8793-39]
M. Wang, D. Galpaya, Z. B. Lai, Y. Xu, C. Yan, Queensland Univ. of Technology (Australia)
- 8793 1P **Simulation of a silicon nanowire array texturing structure for photovoltaic device** [8793-48]
K. Kirah, Univ. Française d'Égypte (Egypt)
- 8793 1Q **Structural changes of polysulfone membrane use for hemodialysis in the consecutive regime: nanometric analysis by AFM** [8793-88]
N. Batina, M. C. Acosta García, A. Avalos Pérez, M. Alberto Ramírez, Univ. Autónoma Metropolitana-Iztapalapa (Mexico); M. Franco, H. Pérez Gravas, Instituto Nacional de Cardiología Dr. Ignacio Chávez (Mexico); M. Cadena Méndez, Univ. Autónoma Metropolitana-Iztapalapa (Mexico)
- 8793 1R **Modelling of nano-silica in cement paste** [8793-121]
M. Rupasinghe, P. Mendis, M. Sofi, T. Ngo, The Univ. of Melbourne (Australia)
- 8793 1S **Finite element simulation of the gating mechanism of mechanosensitive ion channels** [8793-158]
N. Bavi, Australian National Univ. (Australia) and Victor Chang Cardiac Research Institute (Australia); Q. Qin, Australian National Univ. (Australia); B. Martinac, Victor Chang Cardiac Research Institute (Australia)

POSTER SESSION

- 8793 1T **Water soluble and heat resistant polymers by free radical polymerization of lactic acid-based monomers** [8793-19]
H. Tanaka, T. Kibayashi, M. Niwa, Univ. of Tokushima (Japan)
- 8793 1U **Enhanced Faraday rotation of a thick magneto-optical metal sandwiched between two dielectric photonic crystals** [8793-23]
L. Dong, L. Liu, Y. Liu, Y. Shi, Shanxi Datong Univ. (China)
- 8793 1V **Characterization of carbon fiber reinforced resin composites by the nanoindentation technique** [8793-37]
Y. Sun, D. Zuo, L. Cao, W. Lu, Y. Zhu, J. Li, Nanjing Univ. of Aeronautics and Astronautics (China)
- 8793 1W **Structures of hybrids of DNA and carbon nanotubes in air and in liquids** [8793-43]
K. Umemura, T. Hayashida, D. Nii, Y. Yamaguchi, T. Kawashima, Tokyo Univ. of Science (Japan)
- 8793 1X **The high frequency light load fatigue testing machine based on giant magnetostrictive material and stroke multiplier** [8793-93]
M. D. Wang, Soochow Univ. (China); D. S. Li, The Australian National Univ. (Australia) and Nanchang Hangkong Univ. (China); Y. Huang, C. Zhang, K. M. Zhong, L. N. Sun, Soochow Univ. (China)
- 8793 1Y **Relationship between coefficient of friction and surface roughness of wafer in nanomachining process** [8793-120]
J. Li, L. Xia, P. Li, Y. Zhu, Y. Sun, D. Zuo, Nanjing Univ. of Aeronautics and Astronautics (China)
- 8793 1Z **Tunable compact multichanneled filter based on coupled Fabry-Perot cavity resonators** [8793-150]
Y. Liu, L. Dong, L. Liu, Y. Shi, C. Yang, Shanxi Datong Univ. (China)
- 8793 20 **Aerosol self-assembly of nanoparticle films: growth dynamics and resulting 3D structure** [8793-152]
N. Nasiri, The Australian National Univ. (Australia); T. D. Elmøe, Amminex Emissions Technology A/S (Denmark); Q. Qin, A. Tricoli, The Australian National Univ. (Australia)
- 8793 21 **Increased cement paste permeability via novel controlled fatigue technique** [8793-161]
J. Goldman, Univ. of Pennsylvania (United States); C.-Y. Yin, Murdoch Univ. (Australia); X. Chen, Columbia Univ. (United States) and Xi'an Jiaotong Univ. (China)

Author Index

Conference Committee

Conference Chairs

Jayantha A. Epaarachchi, University of Southern Queensland (Australia)
Alan Kin-tak Lau, The Hong Kong Polytechnic University (Hong Kong, China)
Jinsong Leng, Harbin Institute of Technology (China)

Local Organizing Committee

John Bell, Queensland University of Technology (Australia)
Peter Birt, Boeing Research and Technology (Australia)
John Canning, The University of Sydney (Australia)
W. K. Chiu, Monash University (Australia)
Phil Clausen, University of Newcastle (Australia)
Steve Galea, Defence Science and Technology Organisation (Australia)
Mark Ho, University of Wollongong (Australia)
Mainul Islam, University of Southern Queensland (Australia)
Gayan Kahandawa, University of Southern Queensland (Australia)
Harry Ku, University of Southern Queensland (Australia)
Max Lu, University of Queensland (Australia)
Priyan Mendis, The University of Melbourne (Australia)
Ray Morrison, DSDIP, Queensland Government (Australia)
Gang-Ding Peng, The University of New South Wales (Australia)
Qinghua Qin, The Australian National University (Australia)
Chun Wang, RMIT University (Australia)
Hao Wang, University of Southern Queensland (Australia)
Lin Ye, The University of Sydney (Australia)
Richard Clegg, Central Queensland University (Australia)

International Advisory Committee

Debes Bhattacharyya, University of Auckland (New Zealand)
George Akhras, Royal Military College (Canada)
Bill Clyne, University of Cambridge (United Kingdom)
Zhengping Fang, Zhejiang University (China)
Jihua Gou, University of Central Florida (United States)
Jae-Hung Han, Korea Advanced Institute of Science and Technology (Korea, Republic of)
Hai-tao Huang, The Hong Kong Polytechnic University (Hong Kong, China)
Joong-hee Lee, Chonbuk National University (Korea, Republic of)
Yan Li, Tongji University (China)
Kim Meow Liew, City University of Hong Kong (Hong Kong, China)
Yinong Liu, The University of Western (Australia)
W. Van Paepegem, Ghent University (Belgium)

Qibing Pei, University of California, Los Angeles (United States)
Dongwei Shu, Nanyang Technological University (Singapore)
Nobuo Takeda, University of Tokyo (Japan)
Wai-yin Tam, The Hong Kong Polytechnic University (Hong Kong, China)
Jin Wei, The Hong Kong Polytechnic University (Hong Kong, China)
Michael Wisnom, University of Bristol (United Kingdom)
Gang Zhou, Loughborough University (United Kingdom)
David Zimick, NRC Institute for Aerospace Research (Canada)
Jihua Gou, University of Central Florida (United States)
Jae-Hung Han, Korea Advanced Institute of Science and Technology
 (Korea, Republic of)
Hai-tao Huang, The Hong Kong Polytechnic University (Hong Kong, China)
Joong-hee Lee, Chonbuk National University (Korea, Republic of)
Yan Li, Tongji University (China)
Kim Meow Liew, City University of Hong Kong (Hong Kong, China)
Yinong Liu, The University of Western (Australia)
W. Van Paepegem, Ghent University (Belgium)
Qibing Pei, University of California, Los Angeles (United States)
Dongwei Shu, Nanyang Technological University (Singapore)
Nobuo Takeda, University of Tokyo (Japan)
Wai-yin Tam, The Hong Kong Polytechnic University (Hong Kong, China)
Jin Wei, The Hong Kong Polytechnic University (Hong Kong, China)
Michael Wisnom, University of Bristol (United Kingdom)
Gang Zhou, Loughborough University (United Kingdom)
David Zimick, NRC Institute for Aerospace Research (Canada)

Session Chairs

- 1 Nanomaterials for Bioengineering
Zhongze Gu, Southeast University (China)
Antonio Tricoli, Australian National University (Australia)
Mai Thu Thi Tran, The University of Auckland (New Zealand)
Guojie Wang, University of Science and Technology Beijing (China)
- 2 Smart Materials and Structures
John Canning, The University of Sydney (Australia)
Luis Garcia Gancedo, University of Cambridge (United Kingdom)
Gayan Kahandawa, University of Southern Queensland (Australia)
Priyan Mendis, The University of Melbourne (Australia)
Hideaki Tsukamoto, Nagoya Institute of Technology (Japan)
- 3 Carbon Nanotubes and their Application
Zhengping Fang, Zhejiang University (China)
Aimin Yu, Swinburne University of Technology (Australia)
- 4 Renewable Materials and Technologies
Mainul Islam, University of Southern Queensland (Australia)
Mohd Sapuan Salit, Universiti Putra Malaysia (Malaysia)

- 5 Electro-active Polymers
Chunye Xu, University of Science and Technology of China (China)
Yuanhui Zheng, The Melbourne Centre for Nanofabrication (Australia)
- 6 Aerospace Composites
Li Li, The Hong Kong Polytechnic University (Hong Kong, China)
Dahua Shou, The University of Sydney (Australia)
Jing Wang, Deakin University (Australia)
- 7 Modeling and Simulation
Yu Dong, Curtin University (Australia)
Shen Hin Lim, The University of New South Wales (Australia)
Qinghua Qin, Australian National University (Australia)
Mai Thu Thi Tran, The University of Auckland (New Zealand)

Introduction

The Fourth International Conference on Smart Materials and Nanotechnology in Engineering (SMN 2013) was co-organized by Harbin Institute of Technology, University of Southern Queensland, and The Hong Kong Polytechnic University, and took place 10–12 July 2013 at Gold Coast, Australia.

Recently, the design of a new material with a multi-functional capability has become a key research focus in all materials science and engineering discipline. "Smart material" is one having a structure at the nano-structural level that responds in a particular and controlled way to influences upon it. These range from magnetically changed materials, to "memory" molecules that return to their original form, to materials that generate an electric charge when pressed, twisted, or warped. To some extent, a structure made by this material or more than one type of this material incorporated with an appropriated sensor system has been well defined as a "smart structure", that can be used for the implementation of a damage and performance detection strategy for aerospace, civil, and mechanical engineering and other applications.

Since the last decade, an increasing interest in the development of miniaturized structures and systems, particularly on micro- and nano-electromechanical systems (MEMs and NEMs), and integrated biosensor systems has evolved a new page in the area of smart materials and nanotechnology. The scope of this conference was mainly focused on smart materials and structure, and nanotechnology for different engineering applications ranging from nano-structural and biosensor systems to large scale structures, like smart wind turbine technology and solar energy systems for space vehicles. The topics covered in the conference were in the following areas:

- Sensors and actuators
- Fibre-optic sensor technology
- Multifunctional materials
- Nano-structural composites
- Bio-inspired materials and structures
- Mechanics and modeling
- Applications.

On behalf of the conference chairmen, we would like to express our sincere thanks to all the participants for their scientific contribution to this conference. We convey our gratitude to all the reviewers for their time and dedication to read through all submitted papers and provide a fair judgment on their suitability for

presentation. We applaud SPIE for their support to include all accepted papers in these proceedings.

Jayantha A. Epaarachchi
Alan Kin-tak Lau
Jinsong Leng