# The Fiber Society Spring 2013 Technical Conference

## Greelong, Australia
## 22 - 24 May 2013

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The Fiber Society
North Carolina State University
College of Textiles
PO Box 8301
Raleigh, NC, 27695-8301
USA

Phone: (919) 513-0143
Fax: (919) 515-3057

admin@thefibersociety.org

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# Wednesday, May 22

8:00 Registration; Coffee and Tea Service
9:00 Welcoming Remarks, Business, and Announcements *Xungai Wang, Conference Chair*
*Rudolf Hufenus, President, Fiber Society*
*Professor Lee Astheimer, DVC(R), Deakin University*

## *Morning Session*

| | |
|---|---|
| 9:20–10:00 | **Keynote Speaker: Professor Gordon Wallace, University of Wollongong**<br>***Highly Functional Fibres for Bionics***<br>**(Room 1)** |

| | **Room 1** | **Room 2** |
|---|---|---|
| | **Session: Functional Fibrous Materials**<br>***Laurence Schacher, Chair*** | **Session: High-Performance Fibres and Composites**<br>***Greg Rutledge, Chair*** |
| 10:00 | *Self-Healing Superamphiphobic Fabrics with Directional Fluid-Transport Function* 3<br>Tong Lin, Hua Zhou, and Hongxia Wang, Deakin University | *Biodegradable Fibers from Renewable Sources: Melt Spinning of Polyhydroxyalkanoates (PHAs)* 53<br>Rudolf Hufenus[1], Felix A. Reifler[1], Katharina Maniura-Weber[1], Manfred Zinn[2], Adriaan Spierings[3], and Urs J. Hänggi[4], [1]Empa, [2]University of Applied Sciences Western Switzerland, [3]irpd, institute for rapid product development, [4]Biomer |
| 10:20 | *Instrumented Manikin Evaluation System for Optimizing Protective Clothing Performance* 5<br>Guowen Song[1,2], Mei Zhang[2], Yehu Lu[3], and Chunyan Wu[2], [1]University of Alberta, [2]Jilin University, [3]Donghua University | *Structure/Properties Relationship in a Single Para-Aramid Fibre* 55<br>Judith Wollbrett-Blitz[1,2], Alba Marcellan[1], Sébastien Joannès[2], and Anthony Bunsell[2], [1]PPMD, ESPCI, UPMC, [2]Centre des Matériaux P-M Fourt, ENSMP |
| 10:40 | ***Break*** | |
| 11:00 | *Functional Fabric Design for Improvement of Garment Ventilation* 7<br>Chao Sun[1], Joe Sau-chuen Au[1], Jintu Fan[1, 2], and Rong Zheng[3], [1]Hong Kong Polytechnic University, [2]Cornell University, [3]Beijing Institute of Fashion Technology | *Toward the Development of a High Strain Rate Testing Standard for Advanced Fibers* 57<br>Gale A. Holmes, Jae-Hyun Kim, N. Alan Heckert, Walter G. McDonough, Stefan D. Leigh, and Kirk D. Rice, National Institute of Standards and Technology |
| 11:20 | *Biomechanically Compliant Polymeric Structures for Cardiovascular Implant Applications* 9<br>Charanpreet Singh[1], Yosry Morsi[2], and Xungai Wang[1], [1]Deakin University, [2]Swinburne University of Technology | *Surface and Bulk Crystallinity of Polypropylene Filaments* 59<br>Ali Kilic[1], Eunkyoung Shim[2], and Behnam Pourdeyhimi[2], [1]İstanbul Technical University, [2]North Carolina State University |
| 11:40 | *Thermal Insulation Properties of Silkworm Cocoons* 11<br>Jin Zhang[1], Rangam Rajkhowa[2], Jingliang Li[1], Ziangyang Liu[2], Xungai Wang[1,3], [1]Deakin University, [2] National University of Singapore, [3]Wuhan Textile University | *Effect of Electrolytic Oxidation and Sizing on the Mechanical Performance of Carbon Fibre Composites* 61<br>Claudia Creighton, Abdullah Kafi, and Bronwyn Fox, Deakin University |

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|---|---|---|
| 12:00 | *The Mechanism of Needle Penetration Through a Woven Aramid Fabric* 13<br>Christopher Hurren, Qing Li, Alessandra Sutti, and Xungai Wang, Deakin University | *Multifunctional Carbon Nanotube Yarns — Production, Properties, and Applications* 63<br>Menghe Miao, CSIRO Materials Science and Engineering Division |
| 12:20 | *Vibration Isolation Properties of Weft-Knitted Spacer Fabrics* 15<br>Hong Hu, Fuxing Chen, and Lai Xu, Hong Kong Polytechnic University | *Transverse Modulus of Carbon Fibres* 65<br>Linda Hillbrick, Jamieson Kaiser, Mickey Huson, and Geoff Naylor, CSIRO Materials Science and Engineering |
| 12:40 | ***Lunch at Mercure Hotel*** | |

## *Afternoon Session*

| | | |
|---|---|---|
| 2:00–2:40 | **Keynote Speaker: Professor Lei Jiang, Chinese Academy of Sciences**<br>***Bioinspired, Smart, Multiscale Interfacial Materials***<br>**(Room 1, via Skype)** | |
| | **Room 1** | **Room 2** |
| | **Session: Functional Fibrous Materials** ***cont'd***<br>***Stephen Michielsen, Chair*** | **Session: Natural Fibres**<br>***Janice R. Gerde, Chair*** |
| 2:40 | *Detecting Free Radicals in Fibrous Materials Exposed to Light* 17<br>Keith R Millington[1] and Siti Farhana Zakaria[2], [1]CSIRO Materials Science and Engineering, [2]Universiti Teknologi MARA | *Biomimetic Melanin Dyestuffs for Wool Fabric In Situ Coloration* 93<br>John H. Xin, Vicky L. L. So, and Liang He, Hong Kong Polytechnic University |
| 3:00 | *A Novel Conducting Polymer-Carbon Nanotube Composite Yarn* 19<br>J. Foroughi[1], G. M. Spinks[1], G. G. Wallace[1], and R. H. Baughman[2], [1]University of Wollongong, [2]University of Texas at Dallas | *Mohair Fibre Quality and Production as Related to Animal Size* 95<br>Bruce A. McGregor[1] and Kym Butler[2], [1]Deakin University, [2]Department of Primary Industries |
| 3:20 | *Photoreduction of Graphene / Photocatalyst Nanostructured Fabric for Recycled Pollutant Removal* 21<br>Jinfeng Wang[1], Takuya Tsuzuki[1,3], Lu Sun[1], and Xungai Wang[1,2], [1]Deakin University, [2]Wuhan Textile University, [3]Australian National University | *Chemical Treatments on Hemp Fibre Composites* 97<br>Hao Wang[1], Mazed Kabir[1], and K. T. Lau[2], [1]University of Southern Queensland, [2]Hong Kong Polytechnic University |
| 3:40 | ***Break*** | |
| 4:00 | *Effect of Softener on Flame Retardant Finish of Cotton Fabrics* 23<br>K. P. Tang[1], C. W. Kan[1], J. T. Fan[1,2], S .L. Tso[1], [1]Hong Kong Polytechnic University, [2]Cornell University | *Water and Soil Resistant Bamboo Fabric by Sol-Gel Nano-Coating* 99<br>Awais Khatri, Zahir Ahmed, Saiqa Agha, Saqib Munawar, Shahwaiz Khanzada, and Saif-ur-Rehman, Mehran University of Engineering and Technology |
| 4:20 | *Robust, Electro-Conductive, Self-Healable, Superamphiphobic Fabrics from PEDOT/FD-POSS/FAS Coating* 25<br>Hongxia Wang, Hua Zhou, and Tong Lin, Deakin University | *Silk Cocoon Structure and Its Protective Roles* 101<br>Jasjeet Kaur[1], Rangam Rajkhowa[1], Takuya Tsuzuki[1], Keith Millington[2], and Xungai Wang[1], [1]Deakin University, [2]CSIRO Materials Science and Engineering |

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|---|---|---|
| 4:40 | *In Situ Electrochemical Polymerization of Pyrrole onto Textiles: Influence of Add-On and Surface Roughness* 27<br>Kushal Sen, Dipayan Das, and Syamal Maiti, Indian Institute of Technology | *Wrinkle Resistant Finishing of Cotton Fabric Using HDAS on the Crosslinking Agent* 103<br>Jianwei Xing, Chengshu Xu, Yan Ren, Wenzhao Shi, and Jinshu Liu, Xi'an Polytechnic University |
| 5:00 | *Design of Smart Functional Apparel Products for Moxa Moxibustion* 29<br>Li Li, Wai-man Au, Feng Ding, and Kwok-shing Wong, Hong Kong Polytechnic University | *Cottonscope Determination of Cotton Fiber Maturity and Fineness Using Small Samples* 105<br>G. R .S. Naylor[1] and J.E. Rodgers[2], [1]CSIRO Materials Science and Engineering, [2]USDA-ARS-Southern Regional Research Center |
| 5:20 | *Dynamic Plantar Pressure Monitoring of Diabetic Patients Using Intelligent Footwear System Based on Fabric Sensor During Daily Activities* 31<br>Kaiyang Mai[1], Lin Shu[1], Xiaoming Tao[1], Wingcheung Wong[2], Kafai Lee[2], Siuleung Yip[2], Anthony Waihung Shum[2], Wailam Chan[2], Chipang Yuen[2], Ying Li[1], [1]Hong Kong Polytechnic University, [2]Kwong Wah Hospital | *Ionic Liquids: Solvents for Protein Polymer Processing* 107<br>Nolene Byrne and Xungai Wang, Deakin University |
| 5:40 | *Wearable Sensors for the Prophylaxis of Lower Limb Pathologies* 33<br>M. J. Abreu[1], A. Catarino[1], A. M. Rocha[1], F. Derogarian[2,3], R. Dias[2], J. M. da Silva[2,3], J. C. Ferreira[2,3], V. G. Tavares[2,3], and M. V. Correia[2,3], [1]Universidade do Minho, [2]Inesc Tec, [3]Universidade do Porto | *Eri Silk: Cocoon, Fibre, and Proteins* 109<br>Rangam Rajkhowa[1], Ravindeer Rawat[2], Suradip Das[2], Jasjeet Kaur[1], Ben J. Allardyce[1], Utpal Bora[2], and Xungai Wang[1], [1]Deakin University, [2]Indian Institute of Technology |

**6:30 p.m. Dinner at Wharf Shed Café (walking distance; shuttles available)**

# Thursday, May 23

8:00 Coffee and Tea Service

## *Morning Session*

| | |
|---|---|
| 9:00–9:40 | **Keynote Speaker: Dr. Gregory Rutledge, MIT**<br>***Applications of Electrospun Nonwoven Fiber Membranes for Sensing and Separations***<br>**(Room 1)** |

| | **Room 1** | **Room 2** |
|---|---|---|
| | **Session: Nanofibres**<br>***Tong Lin, Chair*** | **Session: Functional Fibrous Materials**<br>***John Xin and Rangam Rajkhowa, Chairs*** |
| 9:40 | *Super-Crystalline Cellulose Nanofibers by Self-Assembling* 129<br>You-Lo Hsieh, University of California at Davis | *Characterization of Thermal Comfort of Weft-Knit Ballistic Nylon/Wool Fabric* 35<br>Rana Mahbub, Lyndon Arnold, and Lijing Wang, RMIT University |
| 10:00 | *Mechanical-to-Electrical Energy Conversion of Needleless Electrospun Poly(vinylidene fluoride) Nanofiber Webs* 131<br>Jian Fang, Haitao Niu, Hongxia Wang, Xungai Wang, and Tong Lin, Deakin University | *Optimization of Fibre Composition in Nonwoven Air Filter Media* 37<br>R. Chattopadhyay, Dipayan Das, and Arun Kumar Pradhan, Indian Institute of Technology |

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|---|---|---|
| 10:20 | *Electrospun Nanofiber Mats with Controlled Microstructures for Nanoparticle Filtration 133*<br>Negar Ghochaghi, Adetoun Tawio, and Gary Tepper, Virginia Commonwealth University | *Graft Co-Polymerization of Acrylic Acid on Nylon 6 Knitted Fabric Using Redox Systems* 39<br>Farzad Mohaddes, Stanley Fergusson, and Lijing Wang, RMIT |
| 10:40 | ***Break*** | |
| 11:00 | *Induced Negative Viscosity as a Degree of Freedom in the Electrospinning of Polymeric Solutions 135*<br>Juan P. Hinestroza, Lina M. Sanchez-Botero, and Alejandro Garcia, Cornell University | *Multifunctional Cotton Fabric Using $TiO_2/SiO_2$ Nanocomposite 41*<br>Esfandiar Pakdel[1], Walid A. Daoud[2], and Xungai Wang[1], [1]Deakin University, [2]City University of Hong Kong |
| 11:20 | *Characterization of Electrospun Mat Composed of Polymer and Mesoporous Silica Nanoparticles 137*<br>Laurence Schacher[1], Slimane Almuhamed[1], Nabyl Khenoussi[1], Magali Bonne[2], Bénédicte Lebeau[2], Dominique C. Adolphe[1], and Jocelyne Brendle[2], [1]ENSISA, [2]Institut de Science des Matériaux de Mulhouse | *Measurement and Evaluation of Magnetic Fabric 43*<br>Yan Chen, Gao Jie Yu, and Fei Fei Wu, Soochow University |
| 11:40 | *Encapsulation of Active Agents in Electrospun Nanofibers/Nanowebs 139*<br>Tamer Uyar, Fatma Kayaci, Zeynep Aytac, and Asli Celebioglu, Bilkent University | *A Novel Super Absorbent Polyester Fabric Functionalized by a Biodegradable Poly (γ-glutamic acid) Hydrogel 45*<br>Zheng Li, JianFei Zhang, JianJun Yan, JiXian Gong, and JingXin Wang, Tianjin Polytechnic University |
| 12:00 | *ZnO Nanorod-Based Solar Textiles for Smart Clothing 141*<br>Youngjin Chae and Eunae Kim, Yonsei University | *Enhancing Thermal Conductivity of Cotton Fabrics with Nanocomposite Coatings 47*<br>Yan Zhao, Amir Abbas, Xungai Wang, and Tong Lin, Deakin University |
| 12:20 | *Nanocrystal $TiO_2$ as Scattering Layer for Dye-Sensitized Solar Cells 143*<br>Xueyang Liu[1], Jian Fang[1], Mei Gao[2], and Tong Lin[1], [1]Deakin University, [2]CSIRO | *Study on Parameters Affecting the Performance of Piezo-Resistive Conductive Fabric 49*<br>Weijing Yi[1,2], Xiaoming Tao[2], Yangyon Wang[3], Guangfeng Wang[3], and Rong Zheng[1], [1]Beijing Institute of Fashion Technology, [2]Hong Kong Polytechnic University, [3]AdvanPro Limited |
| 12:40 | ***Lunch at Mercure Hotel*** | |

## *Afternoon Session*

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|---|---|
| 2:00–2:40 | **Keynote Speaker: Professor Zhengzhong Shao, Fudan University**<br>***Structure and Property Relationships of Animal Silks***<br>**(Room 1)** |

| | **Room 1** | **Room 2** |
|---|---|---|
| | **Session: Natural Fibres *cont'd***<br>***Cheryl Gomes, Chair*** | **Session: High-Performance Fibres and Composites**<br>***Bronwyn Fox, Chair*** |

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|---|---|---|
| 2:40 | *An Assessment of Alternative Cotton Fiber Quality Attributes and Their Influence on Yarn Strength 111*<br>Robert L. Long[1], Michael P. Bange[2], Christopher D. Delhom[3], Jeffrey S. Church[1], and Greg A. Constable[2], [1]CSIRO Materials Science and Engineering, [2]CSIRO Plant Industry, [3]USDA-ARS Southern Regional Research Center | *Water Effects on Natural Fibers and Its Implications to Shape Memory Polymer Composite Fiber 67*<br>Jinlian Hu, Jing Lu, and Jianping Han, Hong Kong Polytechnic University |
| 3:00 | *Photostability of Chemically Modified Silk 112*<br>Weiguo Chen[1,3], Zongqian Wang[1], Donghui Pan[1], Zhihua Cui[1], Keith Millington[2], and Xungai Wang[3], [1]Zhejiang Sci-Tech University, [2]CSIRO Materials Science and Engineering, [3]Deakin University | *Open* |
| 3:20 | *Open* | *Deformation of Dispersed Phase During PS/PP Melt Spinning 69*<br>Long Chen, Houkang He, Shanshan Sun, Yu Zhang, and Zongyi Qin, Donghua University |
| 3:40 | ***Break*** | |
| 4:00 | *Assessing Yarns to Predict the Comfort Properties of Fabrics 114*<br>Maryam Naebe[1], Bruce A. McGregor[1], David Tester[2], and Xungai Wang[1], [1]Deakin University, [2]CRC for Sheep Industry Innovation Ltd. | *Characterisation of Composite Honeycomb Sandwich Structures Cured Using the Quickstep Process 71*<br>M. Jennings[1], M. de Souza[1], C. Creighton[1], S. Agius[1], T. Pierlot[2], and B. Fox[1], [1]Deakin University, [2]CSIRO Materials Science and Engineering |
| 4:20 | *Sock Fabrics: Measuring the Coefficient of Static and Dynamic Friction to Prevent Blisters 116*<br>Rebecca Van Amber, Raechel Laing, Cheryl Wilson, Bronwyn Lowe, and Brian Niven, University of Otago | *Interfacial Improvement of Carbon Fiber/Epoxy Composites by Using Electrospray Carbon Nanotube Deposition 73*<br>Quanxiang Li[1], Jeffrey Church[2], Abdullah Kafi[1], Minoo Naebe[1], and Bronwyn Fox[1], [1]Deakin University, [2]CSIRO Materials Science and Engineering |
| 4:40 | *Comparative Study of Wool, Cotton, and Ramie Bundle Fibers' Dynamic Mechanical Properties 118*<br>Zhigang Xia, Weilu Xu, Weigang Cui, JingJing Huang, Wuhan Textile University | *Force Shield Textile Composite with Microcapsule System 75*<br>Xing Liu[1,2], Rui Wang[1,2], Fangli Pang[1,2], Mengxuan Li[1,2], Jiao Huang[1,2], and Zhili Zhong[1,2], [1]Tianjin Polytechnic University, [2]Key Laboratory of Advanced Textile Composite Materials |
| 5:00 | *The Weft-Knitted Plant-Structured Fabric for Polo Shirt 120*<br>Qing Chen[1] and Jintu Fan[2], [1]Hong Kong Polytechnic University, [2]Cornell University | *Study on Preparation and Properties of Modified Polypropylene Fibers Used in Engineering 76*<br>Yiren Chen[1], Li He[1], and Zhiqiang Fan[2], [1]Wuhan Textile University, [2]Changjiang Water Resources Commission |

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| 5:20 | *Silk Films as Promising Materials for the Repair of Chronic Perforations of the Tympanic Membrane* 122<br>Ben Allardyce[1], Bing Mei Teh[2,3], Rangam Rajkhowa[1], Robert Marano[2,3], Sharon Redmond[2,3], Yi Shen[2,3,4], Marcus Atlas[2,3], Rodney Dilley[2,3], and Xungai Wang[1], [1]Deakin University; [2]Ear Science Institute Australia, [3]University of Western Australia, [4]Ningbo Medical Centre | *Methacrylate/Hydroxyethyl Methacrylate Fiber for Organic Compounds Absorbents* 78<br>Yan Feng[1,2], Xiuyang Hao[1], and Jian Chen[1], [1]Tianjin Polytechnic University, [2]Key Laboratory of Advanced Textile Composite Materials of Ministry of Education |
| 5:40 | *Enhanced Moisture Management Properties of Denim Fabrics* 124<br>Sung Hoon Jeong[1], Muhammad Bilal Qadir[1], Uzair Hussain[2], [1]Hanyang University, [2]National Textile University | *Characterization and Preparation of Polyamide 66/OV-POSS Nanocomposite Fibre* 80<br>Yimin Wang, Lin Xiaoxia, Shao Qun, and Kiptanui Koech Jacob, Donghua University |

**6:00 p.m. Reception at Mercure**
**7:00 p.m. Banquet**
**David Tournier, Wathaurong Aboriginal Co-operative, *Plants for Weaving***
**Norm Stanley, Wathaurong Aboriginal Co-operative, Didgeridoo Player**

# Friday, May 24

9:00 Coffee and Tea Service

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|---|---|
| 10:00–10:40 | **Keynote Speaker: Associate Prof. Bronwyn Fox, Deakin University**<br>**Developments in Carbon Fibre Research in Australia**<br>**(Room 1)** |

| | **Room 1** | **Room 2** |
|---|---|---|
| | **Session: High-Performance Fibres and Composites**<br>***Stuart Lucas, Chair*** | **Session: Nanofibres**<br>***Rudolf Hufenus, Chair*** |
| 10:40 | *Graphene Fibers: A Promising Multifunctional Material* 82<br>Chao Gao, Zhen Xu, and Xiaozhen Hu, Zhejiang University | *Process Control of High-Throughput Core-Sheath Electrospinning from a Slit Surface* 145<br>Toby Freyman, Xuri Yan, Quynh Pham, John Marini, and Robert Mulligan, Arsenal Medical, Inc. |
| 11:00 | *Structure and Property Change of Pre-Drawn Aromatic Copolysulfonamide Fiber During Heat-Drawing Process* 84<br>Yumei Zhang[1], Jinchao Yu[1], Rui Wang[1], Shenghui Chen[2], Xiaofeng Wang[2], and Huaping Wang[1], [1]Donghua University, [2]Shanghai Tanlon Fiber Co. | *Structure and Properties of Melt Blown Submicron Fiber Nonwoven* 147<br>Gajanan Bhat[1] and Wanli Han[2], [1]University of Tennessee at Knoxville, [2]Donghua University |
| 11:20 | *Thermal Properties of Poly(ethylene terephthalate) / Nanoclay Nanocomposites Fibers* 86<br>Yusuf Ulcay and Rustam, Uludağ University | *Electrospun Nanofibers for Blood Vessel Tissue Engineering* 149<br>Xiumei Mo, Anlin Yin, and Chen Huang, Donghua University |

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|---|---|---|
| 11:40 | *Molecular Orientation Development in Highly Uni- and Bi-axially Stretched ePTFE Filaments* 88<br>Kyung-Ju Choi, Clean & Science Co. | *Discretized Modeling of Whipping Motion During Electrospinning Process* 151<br>Yong Lak Joo and An-Cheng Ruo, Cornell University |

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| 12:00–2:00 | **Excursion to Deakin University, Waurn Ponds Campus, for Lunch, Poster Setup, and Lab Tour** |

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| 2:00–4:00 | **Poster Presentations**<br>**Tour (in separate groups) of Australian Future Fibres Research & Innovation Centre (AFFRIC), Institute for Frontier Materials (IFM), Deakin University** |

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| 4:00–4:30 | **Poster Awards**<br>**Close of Conference** |

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# Poster Presentations

**Session Chair: You-Lo Hsieh**

## Keynote Speakers