

## SYMPOSIUM W

### Materials and systems for micro-energy harvesting and storage

Symposium Organizers :

**Dario NARDUCCI**, University of Milano Bicocca, Italy

**Luis FONSECA**, CNM-CSIC, Bellaterra, Spain

**Philippe VERECKEN**, IMEC, Leuven, Belgium

**Rob VAN SCHAIJK**, Holst Center, Eindhoven, The Netherlands

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4 May 2016

Thermoelectrics 1 : Luis Fonseca

- 08:30 Nanocrystalline silicon with tungsten silicide inclusion phases: Morphology and thermoelectric properties** W I.1  
Gabi Schierning<sup>1</sup>, Julia Stoetzel<sup>2</sup>, Roland Schmechel<sup>2,4</sup>, Tom Schneider<sup>3</sup>, Hartmut Wiggers<sup>3,4</sup>, Mathis M. Müller<sup>5</sup>, Hans-Joachim Kleebe<sup>5</sup>  
1) IFW Dresden, Helmholtzstr. 20, 01069 Dresden, Germany 2) Nanostrukturtechnik, University of Duisburg-Essen, 47057 Duisburg, Germany 3) Institut für Verbrennung und Gasdynamik - Reaktive Fluide, University of Duisburg-Essen, 47057 Duisburg, Germany 4) Center for Nanointegration Duisburg-Essen (Cenide), University of Duisburg-Essen, Carl-Benz-Str. 199, 47057 Duisburg, Germany 5) Institut für angewandte Geowissenschaften, Darmstadt Technical University, 64287 Darmstadt
- 09:00 Designing energy filtering in semiconductor nanostructures for efficient thermoelectric energy conversion** W I.2  
Xanthippi Zianni (1), Patrice Chantrenne (2) and Dario Narducci (3)  
(1) Dept. of Aircraft Technology, Technological Educational Inst. of Sterea Ellada, 34400 Psachna, Greece (2) Université de Lyon, INSA de Lyon, MATEIS UMR CNRS 5510, Villeurbanne 69621, France (3) Univ. of Milano Bicocca, Dept. Materials Science, via R. Cozzi 55, I-20125 Milano, Italy
- 09:15 Large Area Flexible Thermoelectric Harvesters Based on Silicon Nanotubes** W I.3  
Alex Morata, Gerard Gadea, Eulalia Fontova, Cristina Flox, Albert Tarancón  
Advanced Materials for Energy, Catalonia Institute for Energy Research (IREC), Jardins de les Dones de Negre, 1, P.2, Sant Adrià del Besòs, Barcelona E-08930 Spain
- 09:30 Effect of the annealing on the TE properties of heavily boron doped silicon film** W I.4  
Laura Zulian, Francesco Segrado, Dario Narducci  
Università di Milano Bicocca, Dipartimento di Scienza dei Materiali, via R. Cozzi 55, I-20125 Milano (Italy)
- 09:45 Conjugated Polymer Nanocomposite: Towards a Novel Material for Thermal Energy Microharvesting** W I.5  
Daniela Galliani, Luca Beverina, Dario Narducci  
Dept. of Materials Science, University of Milano Bicocca, via R. Cozzi 55, 20125 Milano, Dept. of Materials Science, University of Milano Bicocca, via R. Cozzi 55, 20125 Milano, Dept. of Materials Science, University of Milano Bicocca, via R. Cozzi 55, 20125 Milano
- 10:00 Thermoelectric properties of thin film materials : influence of the substrate and contact resistance** W I.6  
A. Stolz (1), A. Melhem (1), C. Tchiffo-Tameko (1), A. Petit (1), G. Guegan (2), E. Millon, C. Boulmer-Leborgne (1), N. Semmar (1)  
1) GREMI, UMR 7344 CNRS-Université Orléans, 45067 Orléans Cedex 2, France , 2) ST-Microelectronics, 37071 Tours Cedex 2, France
- 10:15 Coffee break**

Thermoelectrics 2 : Dario Narducci

- 10:45 Survey on thermoelectric energy harvesters** W II.1  
Jan D. Koenig, Karina Tarantik, Jana Heuer, Alexandre Jacquot, Markus Winkler, Martin Jäggle, Kilian Bartholomé  
Fraunhofer-Institut für Physikalische Messtechnik IPM, Functional Materials
- 11:15 Silicon nanowires for thermoelectric harvesting applications: growth, integration and characterization** W II.2  
G. Gadea, J.D. Santos, A. Morata, C. Calaza, M. Salleras, D. Dávila, L. Fonseca, A. Tarancón  
Catalonia Institute for Energy Research (IREC), IREC, IREC, Institute of Microelectronics of Barcelona (IMB-CNM CSIC), IMB-CNM CSIC, ETH Zurich, IMB-CNM CSIC, IREC
- 11:30 Thermoelectric PEDOT:PSS and Single-walled Carbon Nanotubes composites for Printing Applications** W II.3  
Judith Leisten, Lukas Stepien, Aljoscha Roch, Ines Dani, Christoph Leyens  
Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Technische Universität Dresden
- 11:45 Top-down fabrication of high density nanowire arrays for application in thermoelectric micro-energy conversion devices** W II.4  
Luca Belsito, Fulvio Mancarella, Alberto Roncaglia  
Institute of Microelectronics and Microsystems, CNR

- 12:00 Energy harvesting by Nano-structured thermoelectric materials** W II.5  
Olga Caballero-Calero, Jaime Andrés Pérez-Taborda, Alejandra Ruiz-Clavijo, Liliانا Vera-Londoño, Marta Rull-Bravo, Begoña Abad-Mayor, Miguel Muñoz-Rojo, Marisol Martín-González  
IMM-Instituto de Microelectrónica de Madrid (CNM-CSIC), Isaac Newton 8, PTM, E-28760 Tres Cantos, Madrid, Spain

- 12:15 Thermoelectric Power Enhancement in Bulk-Composite of Doped Chalcogenides** W II.6  
Somnath Acharya and Ajay Soni\*  
School of Basic Sciences, Indian Institute of Technology Mandi, Mandi, 175001, India

**12:30 Lunch**

Batteries 1 : Philippe Vereecken

- 14:00 Chemical solution deposition of oxides for energy applications** W III.1  
Marlies K. Van Bael, An Hardy  
Hasselt University Institute for Materials Research (imo-imomec) Inorganic and Physical Chemistry & imec vzw Belgium

- 14:30 Electrochemical Performance of Materials with high interest in lithium-ion batteries prepared by Pulsed Laser Deposition** W III.2  
Rafael Trocoli, Markus Fehse, Alfonso Sepulveda, Edgar Ventosa, Alex Morata and Albert Tarancón  
Department of Advanced Materials for Energy Applications, Catalonia Institute for Energy Research (IREC), Jardins de les Dones de Negre 1, Sant Adria del Besos, Barcelona, Spain

- 14:45 Block copolymer electrolytes for lithium-ion microbatteries: Challenges and opportunities** W III.3  
Ezzeldin Metwalli, Simon Schaper, Max Kaeppel, Majid Rasool, Simon Brunner, Peter Müller-Buschbaum  
TU München, Physik-Department, LS Funktionelle Materialien, 85748 Garching, Germany

- 15:00 Development of a high conductive LiPON and its integration in thin film batteries** W III.4  
L. Le Van-Jodin a, A. Claudel b, C.Secouard a, S. Martin a, JP. Barnes a, F. Sabary a  
Univ. Grenoble Alpes, 38000 Grenoble, France a : CEA, LETI, Minatec Campus, 17 rue des Martyrs 38054 Grenoble, France b : CNRS, Inst NEEL, F-38000 Grenoble, France

- 15:15 Macroporous Cathodes for Lithium-Sulfur Batteries from MWCNTs** W III.5  
Ran Ye 1, Alexandru Vlad 2  
1. ICTEAM, Université catholique de Louvain, Place du Levant 3, B-1348 Louvain-la-Neuve, Belgium, 2. MOST, Université catholique de Louvain, Place du Levant 3, B-1348 Louvain-la-Neuve, Belgium

- 15:30 Lithium-Titanate Thin Films by Solid State Reaction as Electrode Material for Lithium-ion Batteries** W III.6  
Nouha Labyedh(a,b), Brecht Put(a,c), Abdel-Aziz El Mel(a,b), An Hardy(d,e), Marlies K. Van Bael(d,e), Philippe M. Vereecken(a,b)  
(a)imec, Kapeldreef 75, B-3001 Heverlee, Belgium, (b)Center for Surface Chemistry and Catalysis, KU-Leuven, Kasteelpark Arenberg 23, bus 2461, Leuven, B-3001, Belgium, (c)Department of Physics, KU-Leuven, Celestijnenlaan 200D, 3001 Leuven, Belgium, (d)Hasselt University, Institute for Materials Research, Inorganic and Physical Chemistry, Diepenbeek, Belgium, (e)IMEC vzw, Division IMOMEc, Diepenbeek, Belgium

- 16:15 Plenary session**  
EU-40 Materials Prize  
Reach.Out Award  
Graduate students awards ceremony  
followed by social event

## Batteries 2 : Albert Tarancon

- 08:30 Atomic layer deposition for microbatteries** W IV.1  
Ola Nilsen, Knut B. Gandrud, Amund Ruud, Helmer Fjellvåg  
Department of Chemistry, University of Oslo, P.O.Box 1033 Blindern, 0315 Oslo, Norway
- 09:00 RT-IL based polyHIPEs as printable in situ electrolyte filled separators for thin film Li-ion batteries** W IV.2  
Werner Paschinger, Alexander Bismarck  
Institute for Materials Chemistry & Research, University of Vienna, Waehringer Strasse 42, A-1090 Wien, Austria, Institute for Materials Chemistry & Research, University of Vienna, Waehringer Strasse 42, A-1090 Wien, Austria
- 09:15 Atomic/molecular layer deposition of organic electrode materials for thin-film Li-ion batteries** W IV.3  
Mikko Nisula, Maarit Karppinen  
Department of Chemistry, Aalto University
- 09:30 Three-dimensional TiO<sub>2</sub> thin-film electrodes deposited on micro-pillars by spatial atomic layer deposition for Li-ion batteries** W IV.4  
S.Moitzheim<sup>1,2</sup>, J.E. Balder<sup>3</sup>, P. Poedt<sup>3</sup>, S. Unnikrishnan<sup>3</sup>, P.M. Vereecken<sup>1,2</sup>  
1. KU Leuven, Department of Microbial and Molecular Systems, B-3000 Leuven, Belgium 2. imec, Kapeldreef 75, B-3001 Leuven, Belgium 3. Holst Centre, High Tech Campus 31, 5656AE Eindhoven, Netherlands
- 09:45 Nanoarchitectures for hybrid micro-energy harvesting and storage solutions.** W IV.5  
Tomás Clancy, Louise M. McGrath, James F. Rohan  
Electrochemical Materials & Energy, Tyndall National Institute, University College Cork, Ireland
- 10:00 Paving the way towards solid-state 3D thin-film Li-ion batteries** W IV.6  
Philippe M. Vereecken, Maarten Mees, Alfonso Sepulveda  
imec/KU-Leuven, imec, imec
- 10:15 Coffee break**

## Piezoelectrics 1 : Nathan Jackson

- 10:45 Zinc oxide nanorod p-n junction piezoelectric energy harvesters: mechanism, developments and applications** W V.1  
Joe Briscoe  
Materials Research Institute, Queen Mary University of London, UK
- 11:15 Native Cellulose Based Hybrid Piezoelectric Generator for Energy Harvesting and Wireless Pressure Sensor/Power Source** W V.2  
Md. Meheub Alam and Dipankar Mandal  
Md. Meheub Alam, Ph.D scholar Department of Physics Organic Nano-Piezoelectric Device Laboratory (ONPDL) Jadavpur University 188 Raja S.C. Mallik Road Kolkata-700032 West-Bengal, India and Dipankar Mandal, Assistant Professor Department of Physics Organic Nano-Piezoelectric Device Laboratory (ONPDL) Jadavpur University 188 Raja S.C. Mallik Road Kolkata-700032 West-Bengal, India
- 11:30 Adhesion Lithography as an Innovative Manufacturing Process for Coplanar Schottky Diodes Enabling Low Power RF Energy Harvesting** W V.3  
Dimitra G. Georgiadou, James Semple, Gwenthvir Wyatt-Moon, Thomas D. Anthopoulos  
Physics Department, Imperial College London, London, United Kingdom
- 11:45 Detailed investigation of magnetic and structural properties of giant magnetostrictive Terfenol-D for energy harvesting** W V.4  
V. ISSINDOU 1, B. VIALA 1, L. GIMENO 2 3, O. CUGAT 2 3, O. GEOFFROY 4, M. AMARA 4 5, J. DEBRAY 4 5  
1. CEA, LETI, MINATEC Campus, F38000, Grenoble, France, 2. G2Elab, Univ. Grenoble Alpes, F38000, Grenoble, France, 3. CNRS, Univ. Grenoble Alpes, F38000, Grenoble, France, 4. CNRS, Inst NEEL, F-38000 Grenoble, France, 5. Univ. Grenoble Alpes, F-38000 Grenoble, France,
- 12:00 A PiezoMEMS Device to Harvest Vibrational Energy from Power Cords** W V.5  
Nathan Jackson, Ruth Houlihan, Rosemary O'Keefe, Finbarr Waldron, Alan Mathewson, Oskar Z. Olszewski  
Tyndall National Institute University College Cork Ireland
- 12:15 Design and Optimization of a MEMS Based Electromagnetic Vibration Energy Using Sputtered NdFeB Film** W V.6  
Takayuki Fujita, Kohei Yamaguchi, Shinichi Yoshii, Kensuke Kanda, Kazusuke Maenaka  
Graduate School of Engineering, University of Hyogo, Japan

12:30 Lunch

## Piezoelectrics 2 : Rob van Schaijk

- 14:00 Piezoelectric generators: Modeling, design and practical applications** W VI.1  
Peter Woias, Seastian Neiss, Martin Wischke, Michael Kroener, Frank Goldschmidtboeing  
Laboratory for Design of Microsystems, Department of Microsystems Engineering (IMTEK), Albert-Ludwig-University of Freiburg, Germany
- 14:30 Reliability improvements of an electrostatic energy harvester for TPMS** W VI.2  
Martijn Goedbloed, Christine de Nooijer, Michael Renaud, Rob van Schaijk  
Imec/Holst Centre, High Tech Campus 31, Eindhoven, the Netherlands
- 14:45 Selective growth of ZnO nanosheets and their application in piezoelectric and triboelectric energy harvesting devices** W VI.3  
Gonzalo Murillo (a), Minbaek Lee (b), Helena Lozano (a), Isaac Rodríguez-Ruiz (c), and Jaume Esteve (a)  
(a) Department of Nano and Microsystems, Instituto de Microelectrónica de Barcelona (IMB-CNM, CSIC), Bellaterra 08193, Spain, (b) Department of Physics, Inha University, Incheon 22212, South Korea, (c) Commissariat à l'Energie Atomique et Aux Energies Alternatives - CEA/DEN/DTEC/SGCS, F-30207 Bagnols-sur-Cèze, France
- 15:00 Electrostatic Vibration Energy Harvesting Microsystems for Self-Powered Minimally Invasive Pacemakers** W VI.4  
E. Lefeuve (1), S. Risquez (1), B. Vysotskyi (1), J. Wei (1), H. Mathias (1) F. Costa (3), P. Gaucher (2), D. Aubry (2), F. Parrain (1) and M. Woytasik (1)  
(1) IEF-CNRS, Univ. Paris Sud, France (2) MSSMat, Ecole Centrale Paris, France (3) SATIE-CNRS, Univ. Paris Est Créteil, France
- 15:30 Coffee break**

## Poster session : Dario Narducci

- 16:00 Thermal Cycling Behavior of Zinc Antimonide Thin Films for Thermoelectric Power Generation Applications** W PI.1  
Changsu Woo, Hyungcheoul Shim, Seungwoo Han  
Korea Institute of Machinery & Material
- 16:00 Synthesis of reduced graphene oxide-PVDF-BaTiO<sub>3</sub> nanocomposites for flexible energy harvesters** W PI.2  
Usman Yaqoob, Gwiyoung Sang Chung  
University of Ulsan
- 16:00 The LiNi<sub>0.5</sub>Mn<sub>1.5</sub>O<sub>4</sub> based high voltage cathode-materials for all-solid-state thin-film battery** W PI.4  
Joosun Kim<sup>1</sup>, Miyoung Yoon<sup>1</sup>, Seunghwan Lee<sup>2</sup>, Hyunjung Shin<sup>2</sup>, Jooho Moon<sup>3</sup>  
1 High Temperature Energy Materials Research Center, Korea Institute of Science and Technology, Seoul 136-791, Korea, 2 Department of Energy Science, Sungkyunkwan University, Suwon 440-746, Korea, 3 Department of Materials Science and Engineering, Yonsei University, Seoul 120-749, Korea
- 16:00 Electrostrictive MEMS dedicated to mechanical energy harvesting: fabrication and characterization** W PI.5  
H. NESSER<sup>1</sup>, J. YUAN<sup>2</sup>, A. COLIN<sup>2</sup>, P. POULIN<sup>2</sup>, I. DUFOUR<sup>1</sup>, H. DEBEDA<sup>1</sup>, C. AVELA<sup>1</sup>  
1. Université de Bordeaux, IMS, UMR 5218, 351 Cours de la Libération, 33405 Talence Cedex, France 2. CRPP, CNRS, UPR8641, 115 Avenue Schweitzer, 33600 Pessac, France
- 16:00 Nanogenerator for energy harvesting composed of piezoelectric polymer PVDF and graphene electrode** W PI.6  
Hyosub Jung, Yongho Seo\*  
Faculty of Nanotechnology and Advanced Material Engineering, Sejong University, Seoul, 143-747, Korea.
- 16:00 Distribution of sulfur in carbon/sulfur nanocomposites analyzed by small-angle X-ray scattering** W PI.7  
Albrecht Petzold, Anika Juhl, Jonas Scholz, Boris Ufer, Günter Goerigk, Michael Fröba, Matthias Ballauff, Simone Mascotto  
Albrecht Petzold, Günter Goerigk, Matthias Ballauff, Soft Matter and Functional Materials, Helmholtz-Zentrum für Materialien und Energie GmbH, Hahn-Meitner-Platz 1, 14109 Berlin, Germany Anika Juhl, Jonas Scholz, Boris Ufer, Michael Fröba, Simone Mascotto Institute of Inorganic and Applied Chemistry, University of Hamburg, Martin-Luther-King Platz 6, 20146 Hamburg, Germany

16:00	<b>Output power enhancement of triboelectric generators by surface patterning using nanoimprint lithography</b> Yang Hyeog Kwon, Sung-Ho Shin, Joo-Yun Jung, and Junghyo Nah Department of Electrical Engineering, Chungnam National University, Daejeon, 34134, Korea, Department of Electrical Engineering, Chungnam National University, Daejeon, 34134, Korea, Department of Nano Manufacturing Technology, Korea Institute of Machinery and Machinery and Materials, Daejeon, 34103, Korea, Department of Electrical Engineering, Chungnam National University, Daejeon, 34134, Korea,	W PI.8	16:00	<b>Cost-effective fabrication of three-dimensional nanotube arrays for hierarchical core-shell structured pseudocapacitors</b> Yuan GAO, Yuanjing LIN, Zhiyong FAN Yuan GAO, PhD, HKUST, Yuanjing LIN, PhD, HKUST, Zhiyong FAN, Associate Professor, HKUST,	W PI.18
16:00	<b>Transparent and flexible ZnO p-n homojunction piezoelectric nanogenerators</b> Yang Hyeog Kwon, Doo-Hee Kim, Han-Ki Kim, Junghyo Nah Department of Electrical Engineering, Chungnam National University, Daejeon, 34134, Korea, Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University, Yongin-si, Gyeonggi-do, 17104, Korea, Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University, Yongin-si, Gyeonggi-do, 17104, Korea, Department of Electrical Engineering, Chungnam National University, Daejeon, 34134, Korea,	W PI.9	16:00	<b>PiezoMEMS Energy Harvester to power leadless pacemaker</b> Nathan Jackson, Oskar Z. Olszewski, Alan Mathewson, Cian O'Murchu Tyndall National Institute University College Cork, Ireland	W PI.19
16:00	<b>Robust, flexible, and high performance piezoelectric nanogenerators using vanadium-doped ZnO nanosheets-polymer composite structure</b> Sung-Ho Shin, Yang Hyeog Kwon, Joo-Yun Jung, Junghyo Nah Department of Electrical Engineering, Chungnam National University Department of Nano Manufacturing Technology, Korea Institute of Machinery and Materials	W PI.10	16:00	<b>A biodegradable PVDF-based piezoelectric nanogenerator with DNA assisted &amp;#946;-phase nucleation and molecular dipole ordering</b> Abirah Tamang1, Sujoy Kumar Ghosh1, Samiran Garain1, Md. Meheboob Alam1, Karsten Henkel2, Jörg Haebler2, Dieter Schmeißer2, Dipankar Mandal1 1 Organic Nano-Piezoelectric Device Laboratory, Department of Physics, Jadavpur University, Kolkata-700032, India, 2 Angewandte Physik-Sensorik, Brandenburgische Technische Universität Cottbus-Senftenberg, K.-Wachsmann-Allee 17, 03046 Cottbus, Germany	W PI.20
16:00	<b>Triboelectric output power enhancement via chemical surface functionalization</b> Sung-Ho Shin, Yang-Hyuck Kwon, Min Hyung Lee, Junghyo Nah Department of Electrical Engineering, Chungnam National University Department of Applied Chemistry, Kyung Hee University	W PI.11	16:00	<b>An electrochemically functional layer of hydrogenase extract on an electrode of large and tunable specific surface area</b> Stefanie Schlicht, Loïc Assaud, Moritz Hansen, Markus Licklederer, Mikhael Bechelany, Mirjam Perner, Julien Bachmann SS, LA, ML, JB :Department of Chemistry and Pharmacy, Friedrich-Alexander University Erlangen-Nürnberg, Egerlandstrasse 1, D-91058 Erlangen, Germany MH, MP :Faculty of Mathematics, Informatics and Biology, University of Hamburg, Biozentrum Klein Flottbek, Ohnhorststrasse 18, D-22609 Hamburg, Germany MB: Institut Européen des Membranes IEMM, ENSCM UM2 CNRS UMR5635, Place Eugène Bataillon, F-34095 Montpellier Cedex 5, France LA: Current address: ICMMO - Bât. 410, Université Paris-Sud 11, Rue du Doyen Georges Poitou, F-91405 Orsay Cedex, France	W PI.21
16:00	<b>Waste Heat Energy Harvesting by use of BaTiO3 for Pyroelectric Hydrogen Generation</b> R. Belitz (a), J. Zosel (c), M. Schelter (c), P. Meisner (a), M. Coeler (a), U. Wunderwald (a), J. Friedrich (a)(b) (a) Fraunhofer THM, 09599 Freiberg, Germany, (b) Fraunhofer IISB, 91058 Erlangen, Germany, (c) Kurt-Schwabe-Institut für Mess- und Sensortechnik e.V. Meinsberg, 04736 Waldheim, Germany	W PI.12	16:00	<b>On-chip carbon nanotube supercapacitor</b> Olli Pitkänen, Aron Dombovari, Topias Järvinen, Gabriela S. Lorite, Geza Toth, Krisztian Kordas Microelectronics Research Unit, Faculty of Information Technology and Electrical Engineering, University of Oulu	W PI.22
16:00	<b>Enhanced dielectric properties of montmorillonite/high permittivity polymer nanocomposites</b> Nadeesh Madusanka,1 Sai G. Shivareddy,1 Mark D. Eddleston,2 Pritesh Hiralal,1 Rachel A. Oliver3 and Gehan Amaratunga 1 1 Department of Engineering, University of Cambridge, 9 JJ Thomson Avenue, Cambridge CB3 0FA, United Kingdom 2 Department of Chemistry, University of Cambridge, Lensfield Road, Cambridge, CB2 1EW, United Kingdom 3 Department of Materials Science and Metallurgy, University of Cambridge, 27 Charles Babbage Road, Cambridge, CB3 0FS, United Kingdom	W PI.13	16:00	<b>Improvements in Stack Development for All-Vanadium Redox Flow Batteries: Thermally Stable Positive Electrolytes with a Superior</b> Laura Sanz *[a], Cristina Flox [a], Jordi Jacas Biendicho [a], Javier Vázquez- Galván [a], Joan Ramon Morante [a,b] *corresponding autor: lsanz@irec.cat [a] Catalonia Institute for Energy Research, Jardins de les dones de Negre 1, 08930 Sant Adrià del Besos, Barcelona, Spain. [b] Department d'Electronica, Facultat de Fisica, Universitat de Barcelona, Martí i Franques 1, 08028 Barcelona, Spain.	W PI.23
16:00	<b>Preparation and Characterization of Nanoporous Carbon from Coffee Grounds for Energy Application</b> Chang-Hyun Kim1,2, Kyungshik Kim, 1 Jae-Hyun Kim1,2, Seung-Mo Lee1,2, * 1Nano-Convergence Mechanical Systems Research Division, Korea Institute of Machinery & Materials (KIMM), 156 Gajungbuk-ro, Yuseong-gu, Daejeon 34103, South Korea 2Nano Mechatronics, University of Science and Technology (UST), 217 Gajeong-ro, Yuseong-gu, Daejeon 34113, South Korea	W PI.14	16:00	<b>Vanadium Dioxide devices for energy efficient communications, sensing and energy harvesting in Terahertz Wireless Sensor Networks (WSN)</b> W. A. Vitale(1), M. Tamagnone,(2) N. Emond,(3) B. Le Drogoff,(3) S. Capdevila,(2) A. Skrivervik,(2) M. Chaker,(3) J. R. Mosig,(2) and A. M. Ionescu,(1) (1) EPFL, Nanoelectronic Devices Laboratory (NanoLab), 1015 Lausanne, Switzerland (2) EPFL, Laboratory of Electromagnetics and Antennas (LEMA), 1015 Lausanne, Switzerland (3) INRS-Énergie, Matériaux et Télécommunications, 1650 Boulevard Lionel Boulet, Varennes, Québec, Canada J3X 1S2	W PI.24
16:00	<b>Electrochemical characteristics of a supercapacitor electrode based on bi-continuous carbon structure(BCS) material</b> Bit-Na Kim, Yong-Suk Yang, Sung-Hoon Hong and In-Kyu You Electronics and Telecommunications Research Institute(ETRI), Republic of Korea	W PI.15			
16:00	<b>Polymer functionalised strontium doped barium titanate nanofibre composites for high-k dielectrics</b> Hannah Leese, Jaroslava Morávková, Hin Chun Yau, Miroslav Tejkl, Jan Buk, Milo Shaffer Hannah Leese, Department of Chemistry, Imperial College London, London, SW7 2AZ, Jaroslava Morávková, Pardam Nanotechnology, Pardubice, Czech Republic, Hin Chun Yau, Department of Chemistry, Imperial College London, London, SW7 2AZ, Miroslav Tejkl, Pardam Nanotechnology, Pardubice, Czech Republic, Jan Buk. Pardam Nanotechnology, Pardubice, Czech Republic, Milo Shaffer, Department of Chemistry, Imperial College London, London, SW7 2AZ,	W PI.16			
16:00	<b>Na-doped TiO2 nanotube arrays and their applications in supercapacitors</b> Haidong Bian, Hui Li, Zhengtao Xu*, Yang Yang Li* Center of Super-Diamond and Advanced Films (COSDAF), Department of Physics and Materials Science, City University of Hong Kong, Kowloon, Hong Kong, China, Department of Biology and Chemistry, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon, Hong Kong, China	W PI.17			

## Capacitors 1 : Lukas Stepien

- 08:30 Issues and Challenges facing Micro-Supercapacitors** W VII.1  
David Pech  
LAAS-CNRS
- 09:00 Dynamic Observation of Structural Evolution and Electrochemical Behaviors in Co3O4/graphene/CNTs for Supercapacitor Device** W VII.2  
Guan-Min Huang, Tsung-Chun Tsai, Chun-Wei Huang, Wen-Wei Wu  
Department of Materials Science and Engineering, National Chiao Tung University, No.1001, University Rd., East Dist., Hsinchu City 300, Taiwan
- 09:15 In-situ TEM Investigation of the Charging-Discharging Behavior in MnO2/CNTs Supercapacitor Devices** W VII.3  
Tsung-Chun Tsai, Guan-Min Huang, Chun-Wei Huang, Jui-Yuan Chen, Chien-Chih Yang, Tseung-Yuen Tseng and Wen-Wei Wu  
Department of Materials Science and Engineering, National Chiao Tung University, No.1001, University Rd., East Dist., Hsinchu City 300, Taiwan
- 09:30 Electrospun Metal doped CNF as supercapacitor electrodes: From electrode fabrication to application in a prototype** W VII.4  
Hemesh Avireddy \* [a], Cristina Flox [a], Joan Ramon Morante [a, b]  
[a] Catalonia Institute for Energy Research, Jardins de les dones de Negre 1, 08930 Sant Adrià del Besos, Barcelona, Spain. [b] Departament d'Electronica, Facultat de Fisica, Universitat de Barcelona, Martí i Franques 1, 08028 Barcelona, Spain. \*corresponding author: ahemesh@irec.cat
- 09:45 Heterostructure of NiCo2O4 @ NiCo(OH)2 Core-Shell Nanowires on Ni Foam for High-performance Supercapacitors** W VII.5  
Yao Zhang, Yanfang Gao\*, Jinrong Liu  
Inner Mongol University of Technology, Inner Mongol University of Technology
- 10:00 Characterization of layered semiconductor crystals intercalated with ferroelectric materials** W VII.7  
Yu.I. Zhirko1, V.M. Grekhov1, Z.R. Kudrynskiy2, A.P. Bakhtinov3, Z.D. Kovalyuk3, V.V. Netyaga3  
1Institute of Physics NAS of Ukraine, 46, Prospekt Nauki, 03028 Kiev, Ukraine 2School of Physics and Astronomy of Nottingham University, University Park, Nottingham, NG7 2RD, UK 3Chernivtsy Branch of Institute for Material Science Problem NAS of Ukraine, 5, Vilde str., 58001 Chernivtsy, Ukraine

10:15 Coffee break

## Capacitors 2/Thermoelectrics 3 : Alberto Roncaglia

- 10:45 Printable and flexible 3D micro-supercapacitor** W VIII.1  
M. Ahmadi Zeidabadi \*, S. Carrion, A. B. Gomez, L. Molina, O. Alonso, Ch. Aucher, D. Gutiérrez-Tauste  
Leitat technological center, Terrassa , 08225, Spain
- 11:15 Flexible planar microsupercapacitor fabricated on paper by supersonic cluster beam deposition** W VIII.2  
Luca Giacomo Bettini, Andrea Bellacicca, Paolo Piseri, Paolo Milani  
CIMaIna and Dipartimento di Fisica, Università degli Studi di Milano, via Celoria 16, 20133 Milano, Italy
- 11:30 Thermoelectric properties of Bi-Sb-Te thin films prepared by pulsed laser deposition on glass and flexible substrates** W VIII.3  
Elli Symeou, Christiana Nicolaou, John Giapintzakis  
Department of Mechanical and Manufacturing Engineering, University of Cyprus, 75 Kallipoleos Av., P.O. Box 20537, 1678 Nicosia, Cyprus
- 11:45 The use of the thermoelectric liquids as sensors for the thermal characterization of different solid materials** W VIII.4  
Karim TOUATI, Michael DEPRIESTER, Abdelhak HADJ SAHRAOUI, Dorin DADARLAT - UDMM (EAC 4476), Université du Littoral Côte d'Opale, 145 Avenue Maurice Schumann, 59140, Dunkerque, France - COMUE Lille Nord de France, 59044, Lille, France - National R&D Institute for Isotopic and Molecular Technologies, Donat Str. 67-103, Cluj-Napoca, Romania

- 12:00 Variable capacitor energy harvesting based on polymer dielectric and composite electrode** W VIII.5  
Robert Hahn1, Yujia Yang1, Uwe Maaß1, Leopold Georgi2, Joerg Bauer1, and K.-D. Lang2  
1Fraunhofer IZM, Gustav-Meyer-Allee 25, 13355 Berlin, Germany 2Technische Universität Berlin, TIB4/2-1, Gustav-Meyer-Allee 25, 13355 Berlin, Germany

12:30 Lunch

## Batteries 3 : Alexander Bismarck

- 14:00 Segmented rechargeable micro battery for wearable applications based on printed separator and LTO/NMC electrodes** W IX.1  
M. Ferch2, M. Hubl3, M. Molnar1, K. Marquardt2, K. Hoepfner2, M. Luecking2, G. A. Elia2, J. Buk4, R. Hahn1  
1Fraunhofer IZM, Gustav-Meyer-Allee 25, 13355 Berlin, Germany 2Technische Universität Berlin, TIB4/2-1, Gustav-Meyer-Allee 25, 13355 Berlin, Germany 3 HTW Berlin, Wilhelmshofstraße 75A, 12459 Berlin, Germany 4 PARDAM, Žižkova 2494, 413 01 Roudnice nad Labem, Czech Republic
- 14:15 Planar and 3D deposition of lithium phosphate thin film electrolyte by MOCVD** W IX.2  
Jie Xie, Jos F. M. Oudenhoven, Peter-Paul R.M.L Harks, Dongjiang Li, Peter H.L. Notten  
Eindhoven University of Technology, Holst Centre - imec, Forschungszentrum Julich IEK-9
- 14:30 Laser Micropatterned Electrodes and 3D Interconnected Nanowire Networks towards Lithium Microbattery Architectures** W IX.3  
Alexandru Vlad, Vlad-Andrei Antohe, Julien Rolland, Jean-François Gohy, Luc Piroux  
Institute of Condensed Matter and Nanosciences, Université catholique de Louvain, B-1348 Louvain-la-Neuve, Belgium
- 14:45 Inorganic and polymeric nanofibers made by centrifugal spinning technology for application in energy harvesting** W IX.4  
Jan Buk, Miroslav Tejkl, Jana Růžková  
PARDAM s.r.o. Žižkova 2494, Roudnice nad Labem, the Czech Republic
- 15:00 Si-based three-dimensional assembly for lithium-ion batteries** W IX.5  
Georgiana Sandu(1), Hailu G. Kassa(2), Ionel Avram(1), Jean-François Gohy(3), Philippe Leclere(2), Alexandru Vlad(3,4), and Sorin Melinte(1)  
(1) Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Electrical Engineering, Université catholique de Louvain, Louvain-la-Neuve, B-1348 Belgium, (2) Center of Innovation and Research in Materials and Polymers, Laboratory for Chemistry of Novel Materials, University of Mons, Place du Parc 20, Mons, B-7000, Belgium, (3) Institute of Condensed Matter and Nanosciences, Bio-and Soft Matter, Université catholique de Louvain, Louvain-la-Neuve, B-1348 Belgium, (4) Institute of Condensed Matter and Nanosciences, Molecules, Solids and Reactivity, Université catholique de Louvain, Louvain-la-Neuve, B-1348 Belgium.
- 15:15 Atomic Layer Deposition (ALD) Deposited Metal Oxides Nanoparticles for Energy Related Applications** W IX.6  
Fan Yang a, Lianbing Zhang b, Mato Knez a,b  
a, CIC nanoGUNE Consolider, Tolosa Hiribidea 76, 20018 Donostia-San Sebastian, Spain b, IKERBASQUE, Basque Foundation for Science, Maria Diaz de Haro 3, 48013 Bilbao, Spain

15:30 Coffee break

## Integration : Adrian Ionescu

- 16:00 Energy harvesting and storage with Si-based micro and nano structures** W X.1  
Mika Prunnila  
VTT Technical Research Centre of Finland Ltd
- 16:30 Materials Reliability in an Implanted Cardiac Pacemaker with Integrated Micro-Energy Harvesters** W X.2  
William Quinn, Adam Shabib, Sunny Jay, Martin Hill, John Barrett  
Nimbus Centre, Cork Institute of Technology
- 16:45 Integration path for an all-silicon MEMS based thermoelectric micro and nanogenerator** W X.3  
Luis Fonseca (1), Carlos Calaza (1), Marc Salleras (1), Inci Donmez (1), Albert Tarancon (2), Alex Morata (2), Jose-Domingo Santos (2), Gerard Gadea (2)  
(1) IMB-CNM (CSIC), Campus UAB, E-08193 Bellaterra, Spain, (2) IREC, Jardí de les Dones de Negre 1, E-08930 Sant Adrià de Besòs Spain