Preliminary Technical Program

The Executive Committee reserves the right to amend the program, if necessary.
**Wednesday, December 5**

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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>08:00</td>
<td><strong>Conference Welcome</strong></td>
<td>David P. Arnold, <em>University of Florida, USA</em>&lt;br&gt;Luc Fréchette, <em>Université de Sherbrooke, CANADA</em></td>
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<tr>
<td>08:20</td>
<td><strong>Plenary Presentation I</strong></td>
<td>OPTIMIZING THE ENERGY BALANCE TO ACHIEVE AUTONOMOUS SELF-POWERING FOR VIGILANT HEALTH AND IOT APPLICATIONS&lt;br&gt;<em>Veena Misra</em>¹, A. Bozkurt¹, B.H. Calhoun², S. Datta³, M. Dickey¹, M. Kiani⁴, J. Lach², B. Lee¹, J. Jur¹, O. Oralkan¹, M. Ozturk¹, R. Rajagopalan⁴, S. Roundy⁵, J. Strohmaier¹, S. Trolier-McKinstry⁴, D. Vashaee¹, D. Wentzloff⁶ and D. Werner⁴&lt;br&gt;¹_North Carolina State University, USA, ²University of Virginia, USA, ³Notre Dame University, USA, ⁴Pennsylvania State University, USA, and ⁵University of Utah, USA, ⁶University of Michigan, USA</td>
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<tr>
<td>09:00</td>
<td><strong>Focus Session I - Wearable Energy Harvesters</strong></td>
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<td></td>
<td><strong>WFA-01</strong></td>
<td>FLEXIBLE TEXTILE POWER MODULE&lt;br&gt;S. Yong, J. Shi, and S.P. Beeby&lt;br&gt;<em>University of Southampton, UK</em></td>
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<tr>
<td>09:20</td>
<td><strong>WFA-02</strong></td>
<td>FABRICATION AND CHARACTERIZATION OF A WRIST-DRIVEN ROTATIONAL ENERGY HARVESTER USING MULTIPLE PLUCKED PIEZOELECTRIC UNIMORPHS&lt;br&gt;M.A. Halim¹, T. Xue¹, R. Rantz¹, Q. Zhang², L. Gu², K. Yang², and S. Roundy¹&lt;br&gt;¹_University of Utah, USA and ²Analog Devices Inc., USA</td>
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<tr>
<td>10:00</td>
<td><strong>Refreshment Break</strong></td>
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<tr>
<td>SESSION W1A: FUEL CELLS AND REACTORS</td>
<td>SESSION W1B: TUNABLE, BROADBAND, AND NONLINEAR HARVESTERS</td>
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<tr>
<td>Crystal – Tomoka Room</td>
<td>Flagler Room</td>
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<td><strong>10:30 – 10:50</strong></td>
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<td><strong>W1A-01</strong></td>
<td><strong>W1B-01</strong></td>
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<tr>
<td>TESTING OF A 3D-PRINTED SOLAR</td>
<td>MODELING AND DESIGN OF HIGHLY COUPLED PIEZOELECTRIC</td>
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<tr>
<td>MICRO-REACTOR FOR HYDROGEN</td>
<td>ELECTRIC ENERGY HARVESTERS FOR BROADBAND APPLICATIONS</td>
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<td>PRODUCTION VIA NATURAL GAS</td>
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<tr>
<td>P. Camus, J.-F. Dufault, D.</td>
<td>D. Gibus(^1,2), P. Gasnier(^1), A. Morel(^1,2),</td>
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<tr>
<td>Mehanovic, N. Braidy, L.G. Fréchette, and M. Picard</td>
<td>S. Boisseau(^1), and A. Badel(^2)</td>
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<td>**Université de Sherbrooke,</td>
<td>Université Grenoble Alpes, CEA-Leti, France and</td>
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<td>CANADA**</td>
<td><strong>Université Savoie Mont Blanc, France</strong></td>
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<td><strong>10:50 – 11:10</strong></td>
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<tr>
<td><strong>W1A-02</strong></td>
<td><strong>W1B-02</strong></td>
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<tr>
<td>MICRO ALKALINE FUEL CELL</td>
<td>CO-OPTIMIZATION OF A PIEZOELECTRIC ENERGY</td>
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<td>SUPPORTED BY MEMS-BASED BACKBONE</td>
<td>HARVESTING SYSTEM FOR BROADBAND OPERATION</td>
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<tr>
<td>M. Pilaski(^1), S.-H. Sun(^2),</td>
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<td>G. Dura(^1), J. Wartmann(^1),</td>
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<td>F. Letzkus(^2), and A. Heinzel(^1)</td>
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<td>(^1)Hydrogen and Fuel Cell</td>
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<td>Center, GERMANY and</td>
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<tr>
<td>(^2)Institut für Mikroelektronik</td>
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<td>Stuttgart, GERMANY</td>
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<td><strong>11:10 – 11:30</strong></td>
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<td><strong>W1A-03</strong></td>
<td><strong>W1B-03</strong></td>
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<tr>
<td>THERMALLY SELF-SUSTAINING TUBULAR</td>
<td>TOWARD SELF-POWERED NONLINEAR WIDEBAND VIBRATION</td>
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<tr>
<td>SOFC POWER GENERATOR WITH NO MOVING</td>
<td>ENERGY HARVESTING WITH HIGH-ENERGY RESPONSE STABILIZATION</td>
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<td>J. Wongwiwat(^1), P. Bhuripanyo(^1),</td>
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<td>T.S. Welles(^2), V.P. DeBiase(^2),</td>
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<td>J. Ahn(^2), and P.D. Ronney(^1)</td>
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<td>(^1)University of Southern</td>
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<td><strong>W1A-04</strong></td>
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<td>MINIATURE FUEL CELL WITH</td>
<td>SELF-TUNABLE VIBRATION ENERGY HARVESTER</td>
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<td>ELECTRODE-FIRST PROTOTYPE WITH</td>
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<td>AU-PD-PT MULTILAYER CATALYST</td>
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<td>T. Kurose(^1), R. Shirai(^1),</td>
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<td>N. Vasiljevic(^2), and M. Hayase(^1)</td>
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<td>(^1)Tokyo University of Science, Japan and (^2)University of Bristol, UK</td>
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<td><strong>11:50 – 12:10</strong></td>
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<tr>
<td>SESSION W2A: THERMOELECTRIC ENERGY HARVESTERS</td>
<td>SESSION W2B: POWER ELECTRONICS AND ENERGY MANAGEMENT CIRCUITS</td>
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<td>Crystal – Tomoka Room</td>
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<td><strong>13:30 – 13:50</strong></td>
<td><strong>13:50 – 14:10</strong></td>
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<tr>
<td><strong>W2A-01</strong> POWER ENHANCEMENT OF SILICON MEMBRANE-BASED THERMOELECTRIC ENERGY HARVESTER WITH TAILORED HOLEY NANOSTRUCTURES</td>
<td><strong>W2B-01</strong> A SELF-SUSTAINED ENERGY STORAGE SYSTEM WITH AN ELECTROSTATIC AUTOMATIC SWITCH AND A BUCK CONVERTER FOR TRIBOELECTRIC NANOGENERATORS</td>
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<td>R. Yanagisawa¹ and M. Nomura¹,²</td>
<td>H. Zhang¹, D. Galayko², and P. Basset¹</td>
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<td>¹University of Tokyo, JAPAN and</td>
<td>¹Univérsité Paris-Est, FRANCE and</td>
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<tr>
<td>²Japan Science and Technology Agency (JST), JAPAN</td>
<td>²Sorbonne Universités, FRANCE</td>
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<td><strong>14:10 – 14:30</strong></td>
<td><strong>W2B-02</strong> DUAL-STAGE ELECTRODE DESIGN OF ROTATIONAL ELECTRET ENERGY HARVESTER FOR EFFICIENT SELF-POWERED SSHI</td>
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<td><strong>W2A-02</strong> VERTICAL SELF-DEFINED THIN-FILM THERMOELECTRIC THERMOCOUPLES BY ANGLED CO-EVAPORATION FOR USE IN µTEGS</td>
<td>Y. Liu¹, A. Badel², and Y. Suzuki¹</td>
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<td>Y. Yuan and K. Najafi</td>
<td>¹University of Tokyo, JAPAN and</td>
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<td>University of Michigan, USA</td>
<td>²Université Savoie Mont Blanc, FRANCE</td>
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<td><strong>W2A-03</strong> DESIGN AND IMPLEMENTATION OF A SOIL PROFILE PROBE POWERED BY AIR AND SOIL TEMPERATURE DIFFERENCES</td>
<td><strong>W2B-03</strong> A SIMPLE PASSIVE 390 mV AC/DC RECTIFIER FOR ENERGY HARVESTING APPLICATIONS</td>
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<tr>
<td>University of Tokyo, JAPAN</td>
<td>University of Florida, USA</td>
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<td><strong>14:30</strong> Transition Break</td>
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<tr>
<td>Session W3A: Ion Sources and Thermoionic Emitters</td>
<td>Session W3B: Microfabricated Harvesters</td>
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<td>Crystal – Tomoka Room</td>
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<td>14:40 – 15:00</td>
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<td><strong>W3A-01</strong></td>
<td><strong>W3B-01</strong></td>
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<tr>
<td>Compact, 3D-Printed Electron Impact Ion Source with Microfabricated, Nanosharp Si Field Emitter Array Cathode</td>
<td>Push-Button Kinetic Energy Harvester with Soft-X-Ray-Charged Folded Multilayer Piezoelectret</td>
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<td>C. Yang and L.F. Velásquez-García</td>
<td>J. Lu and Y. Suzuki</td>
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<tr>
<td>Massachusetts Institute of Technology, USA</td>
<td>University of Tokyo, JAPAN</td>
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<td>15:00 – 15:20</td>
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<td><strong>W3A-02</strong></td>
<td><strong>W3B-02</strong></td>
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<td>Glow-Discharge Ion Source for On-Chip Integrated Miniature MEMS Mass Spectrometer</td>
<td>A Silicon MEMS EM Vibration Energy Harvester</td>
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<td>Wrocław University of Science and Technology, POLAND</td>
<td>Massachusetts Institute of Technology, USA</td>
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<td>15:20 – 15:40</td>
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<td><strong>W3A-03</strong></td>
<td><strong>W3B-03</strong></td>
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<td>S.M. Nicaise¹, C. Lin¹, M. Azadi¹, T. Bozorg-Grayeli², P. Adebayo-Ige¹, K. Van Houten³, F. Schmitt³, D.E. Lilley¹, Y. Pfitzer¹, W. Cha¹, N. Melosh², R.T. Howe², J.W. Schwede¹, and I. Bargatin¹</td>
<td>H. Honma¹, H. Mitsuya², G. Hashiguchi³, H. Fujita⁴, and H. Toshiyoshi¹</td>
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<td>¹University of Pennsylvania, USA, ²Stanford University, USA, and ³Spark Thermionics, USA</td>
<td>¹University of Tokyo, JAPAN, ²Saginomiya Seisakusho, Inc., JAPAN, ³Shizuoka University, JAPAN, and ⁴Tokyo City University, JAPAN</td>
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**15:40**  Transition Break

**15:50**  Poster and PowerMEMS - in - Action Session A

**17:50**  End of Day
Thursday, December 6

08:00  Conference Announcements

08:15  Exhibitor Table-Top Elevator Pitches

08:20  Plenary Presentation II

TPA-01  MULTIFERROIC MATERIALS, DEVICES AND SYSTEMS: P(VDF-TrFE) BASED SPIRAL THERMO-MAGNETO-ELECTRIC GENERATORS FOR HARVESTING LOW GRADE THERMAL ENERGY
R.A. Kishore¹, D. Singh¹, P. Kumar¹, R. Sriramdas¹, M. Sanghadasa², and Shashank Priya²
¹Virginia Polytechnic Institute and State University, USA, ²U.S. Aviation & Missile Research Development and Engineering Center, USA, and ³Pennsylvania State University, USA

09:00  Focus Session II - Multiferroic Devices and Systems

TFA-01  ELECTRIC-FIELD CONTROLLED MAGNETIC REORIENTATION IN EXCHANGE COUPLED COFEB/NI BILAYER MICROSTRUCTURES
Z. Xiao¹, R. Lo Conte², M. Goiriéna²,³, R.V. Chopdekar², X. Li¹, S. Tiwari¹, C.-H. Lambert², S. Salahuddin², G.P. Carman¹, K. Wang¹, J. Bokor², and R.N. Candler¹,⁴
¹University of California, Los Angeles, USA, ²University of California, Berkeley, USA, ³University of the Basque Country, SPAIN, and ⁴California Nano Systems Institute, USA

TFA-02  BAR-SHAPED MAGNETOELECTRIC GYRATOR
C.M. Leung, X. Zhuang, J. Li, and D. Viehland
Virginia Polytechnic Institute and State University, USA

TFA-03  WIDE-BAND MULTIFERROIC QUARTZ MEMS ANTENNAE
R.L. Kubena¹, X. Pang², K.G. Lee¹, Y.K. Yong², and W.S. Wall¹
¹HRL Laboratories, LLC., USA and ²Rutgers University, USA

10:00  Refreshment Break
## SESSION T4A: BIOCHEMICAL AND BIO-INSPIRED POWER/ENERGY SYSTEMS

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<th>Authors</th>
<th>Institution</th>
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<tr>
<td>10:30</td>
<td>T4A-01</td>
<td>SUPERCAPACITIVE MICRO-BIO-PHOTOVOLTAICS</td>
<td>L. Liu, M. Mohammadifar, and S. Choi</td>
<td>State University of New York-Binghamton, USA</td>
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<tr>
<td>11:00</td>
<td>T4A-02</td>
<td>A COMPLETE TATTOO-BASED WIRELESS BIOFUEL CELL USING LACTATE DIRECTLY FROM SWEAT AS FUEL</td>
<td>R.A. Escalona-Villalpando¹, E. Ortiz-Ortega¹, J.P. Bocanegra-Ugalde², S.D. Minteer³, L.G. Arriaga¹, and J. Ledesma-García²</td>
<td>Centro de Investigación y Desarrollo Tecnológico, MEXICO, Universidad Autónomous de Queretaro, MEXICO, and University of Utah, USA</td>
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<tr>
<td>11:30</td>
<td>T4A-03</td>
<td>VIRUS-ASSEMBLED TECHNOLOGY FOR NEXT GENERATION BIOENERGY HARVESTING DEVICES</td>
<td>S. Chu, A.D. Brown, J.N. Culver, and R. Ghodssi</td>
<td>University of Maryland, USA</td>
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<tr>
<td>11:50</td>
<td>T4A-04</td>
<td>A NOVEL FLEXIBLE CONDUCTIVE SPONGE-LIKE ELECTRODE CAPABLE OF GENERATING ELECTRICAL ENERGY FROM THE DIRECT OXIDATION OF AQUEOUS GLUCOSE</td>
<td>D. Desmaële¹, F. La Malfa¹², F. Rizzi¹, A. Qualtieri¹, M. Di Lorenzo³, and M. De Vittorio¹²</td>
<td>Istituto Italiano di Tenologia, (IIT), ITALY, Università del Salento, ITALY, and University of Bath, UK</td>
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## SESSION T4B: ELECTRET MATERIALS AND HARVESTERS

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<th>Authors</th>
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<tr>
<td>10:30</td>
<td>T4B-01</td>
<td>DEVELOPMENT OF A HIGH-PERFORMANCE AMORPHOUS FLUORINATED POLYMER ELECTRET BASED ON QUANTUM CHEMICAL ANALYSIS</td>
<td>S. Kim, K. Suzuki, and Y. Suzuki</td>
<td>University of Tokyo, JAPAN</td>
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<td>11:00</td>
<td>T4B-02</td>
<td>DEMONSTRATION OF AN ELECTRET GENERATOR FOR ENERGY HARVESTING WITHOUT ANY CHARGING PROCESS: UTILIZATION OF SPONTANEOUS ORIENTATION OF POLAR MOLECULES</td>
<td>Y. Tanaka¹², N. Matsuura¹, and H. Ishii¹</td>
<td>Chiba University, JAPAN and Japan Science and Technology Agency (JST), JAPAN</td>
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<tr>
<td>11:30</td>
<td>T4B-03</td>
<td>STOCHASTIC MODELING OF HUMAN ARM SWING TOWARD STANDARD TESTING FOR ROTATIONAL ENERGY HARVESTER</td>
<td>Y. Tanaka, T. Miyoshi, and Y. Suzuki</td>
<td>University of Tokyo, JAPAN</td>
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<td>11:50</td>
<td>T4B-04</td>
<td>SELF-RECHARGEABLE ELECTRET BASED ON VIBRATION ENERGY HARVESTER</td>
<td>Y. Zhang¹, Y. Hu¹², M. Wang¹, and F. Wang¹²³</td>
<td>Southern University of Science and Technology, CHINA, Hong Kong University of Science and Technology, CHINA, and Chinese Academy of Sciences, CHINA</td>
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**Lunch on Own**
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<tr>
<th>SESSION T5A: BATTERY TECHNOLOGIES</th>
<th>SESSION T5B: PYROELECTRIC ENERGY HARVESTERS</th>
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<td>Crystal – Tomoka Room</td>
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<td>13:30 – 13:50</td>
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<tr>
<td>T5A-01 A LONG-LASTING MICROLITER-SCALE MICROBIAL BIOBATTERY USING SOLID-STATE IONICS M. Mohammadifar and S. Choi <em>State University of New York-Binghamton, USA</em></td>
<td>T5B-01 HYBRIDIZED THERMAL ENERGY HARVESTING MECHANISM M. Kang and E.M. Yeatman <em>Imperial College London, UK</em></td>
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<td>13:50 – 14:10</td>
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<td>T5A-02 DESIGN, MICROFABRICATION AND CHARACTERIZATION OF FREE FORM FACTOR, LIGHTWEIGHT THIN FILM BATTERY FOR POWERING BIOINSPIRED NANO-DRONES BASED ON MEMS ACTUATION S. Oukassi¹, S. Poncet¹, J.R. Frutos², and R. Solot¹</td>
<td>T5B-02 A PYROELECTRIC THIN FILM OF ORIENTED TRIGLYCINE SULFATE NANO-CRYSTALS FOR THERMAL ENERGY Harvesting R. Ghane-Motlagh and P. Woias <em>University of Freiburg, GERMANY</em></td>
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<td>14:10 – 14:30</td>
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<td>T5A-03 DEVELOPMENT OF ALL-SOLID-STATE THIN-FILM SECONDARY BATTERY FOR MEMS AND IOT DEVICE A. Suzuki, S. Sasaki, and T. Jimbo <em>ULVAC, Inc., JAPAN</em></td>
<td>T5B-03 PIEZOELECTRIC AND PYROELECTRIC ENERGY HARVESTING FROM LITHIUM NIOBATE FILMS G. Clementi, S. Margueron, M.A. Suarez, T. Baron, B. Dulmet, and A. Bartasyte <em>Université de Bourgogne Franche-Comté, FRANCE</em></td>
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<td>14:30</td>
<td>Transition Break</td>
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<tr>
<td>SESSION T6A: WIRELESS POWER TRANSFER TECHNOLOGIES</td>
<td>SESSION T6B: PUMPS AND HEAT ENGINES</td>
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<td><strong>14:40 – 15:00</strong></td>
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<tr>
<td><strong>T6A-01</strong></td>
<td><strong>T6B-01</strong></td>
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<tr>
<td>Flexible screen-printed coils for wireless power transfer using low-frequency magnetic fields</td>
<td>Low-cost, monolithically 3D-printed, miniature high-flow rate liquid pump</td>
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<tr>
<td>University of Florida, USA</td>
<td>¹Edwards Vacuum LLC, USA and ²Massachusetts Institute of Technology, USA</td>
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<td><strong>15:00 – 15:20</strong></td>
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<td><strong>T6A-02</strong></td>
<td><strong>T6B-02</strong></td>
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<tr>
<td>Experimental study of the effect of depth, orientation, and alignment for a MEMS diaphragm receiver in acoustic power transfer systems</td>
<td>MISTIC - Micro Stirling heat engines for thermal energy harvesting</td>
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<tr>
<td>H. Basaeri, Y. Yu, D. Young, and S. Roundy</td>
<td>T. Avetissian¹, É. Léveillé¹, M.-A. Hachey¹, F. Formosa², and L.G. Fréchette¹</td>
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<tr>
<td>University of Utah, USA</td>
<td>¹Université de Sherbrooke, CANADA and ²Université Savoie Mont Banc, FRANCE</td>
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**15:20** Transition Break

**15:30** Poster & PowerMEMS - in - Action Session B

**17:30** End of Day

**17:30** Banquet at Kennedy Space Center

**22:00** Arrive back at the Hilton Daytona Beach
Friday, December 7

08:00  Conference Announcements

08:10  PowerMEMS 2019 Announcement

08:20  Plenary Presentation III

FPA-01  ZERO AND NEAR ZERO POWER INTELLIGENT MICROSYSTEMS
Roy (Troy) H. Olsson III¹, C. Gordon², and R. Bogoslovov³
¹Defense Advanced Research Projects Agency (DARPA), USA,
²Booze Allen Hamilton, USA, and ³Bogoslovov Consulting Ltd., USA

09:00  Focus Session III – Zero-Power Devices and Systems

09:00 - 09:20
FFA-01  AN AUTONOMOUS INTERFACE CIRCUIT BASED ON SELF-INVESTING SYNCHRONOUS ENERGY EXTRACTION FOR LOW POWER PIEZOELECTRIC ENERGY HARVESTERS
B. Çiftci, S. Chamanian, H. Uluşan, and H. Külah
Middle East Technical University, TURKEY

09:20 - 09:40
FFA-02  ENERGY HARVESTING PIEZOELECTRIC WIND SPEED SENSOR
M. Shi, E.M. Yeatman, and A.S. Holmes
Imperial College London, UK

09:40 - 10:00
FFA-03  EVENT DRIVEN TIME-LOGGING SYSTEM BASED ON CONTINUOUS OPERATION OF REAL TIME CLOCK TOWARDS PERPETUAL ELECTRONICS
S. Yamada and H. Toshiyoshi
University of Tokyo, JAPAN

10:00  Refreshment Break

10:30  Session F7 - LATE NEWS AND EMERGING TOPICS

F7A-01  SYNCHRONOUS CIRCUITS WITH SELF-ADAPTIVE MECHANICAL SWITCHES OF VISCOS MATERIAL: A PARAMETER STUDY
Z. Yuan, W. Liu, W. Tian, Y. Huang, and Z. Zhao
Southwest Jiaotong University, CHINA
F7A-02 WEARABLE TRIBOELECTRIC GENERATOR BASED ON A HYBRID MIX OF CARBON NANOTUBE AND POLYMER LAYERS
M. Su¹, J. Brugger², and B.J. Kim¹
¹University of Tokyo, JAPAN and
²École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

F7A-03 A PD/Al₂O₃-BASED MICRO-REFORMER UNIT FULLY INTEGRATED IN SILICON TECHNOLOGY FOR H-RICH GAS PRODUCTION
M. Bianchini¹, N. Alayo¹, L. Sole³, M. Salleras², L. Fonseca², J. Llorca³, and A. Tarancon¹,⁴
¹Catalonia Institute for Energy Research (IREC), SPAIN, ²IMB-CNMT (CSIC), SPAIN, ³Universitat Politècnica de Catalunya, SPAIN, and ⁴ICREA, SPAIN

F7A-04 MAGNETIC PENDULUM ARRAYS FOR EFFICIENT WIRELESS POWER TRANSMISSION
S.P. Mysore Nagaraja¹, R.U. Tok¹, R. Zhu², S. Bland³, A. Propst³, and Y.E. Wang¹
¹University of California, Los Angeles, USA, ²Axend Inc, USA, and ³Nextgen Aeronautics, USA

11:50 Award Ceremony

12:10 Conference Adjourns
**Poster Session A**  
Wednesday, December 5  
15:50 - 17:50  
St. John’s – Halifax Room

### a - APPLICATIONS AND INNOVATIONS IN MICRO ENERGY SYSTEMS

#### Energy-Autonomous Wireless Sensors for IoT

**PW-01a**  
ROBUST SELF-POWERED WIRELESS PLANT-MONITORING SENSOR SYSTEM WITH SAP-ACTIVATED BATTERY  
S. Okamoto\(^1\), R. Furumori\(^1\), A. Tanaka\(^1\), F. Utsunomiya\(^2\), and T. Douseki\(^1\)  
\(^1\)Ritsumeikan University, JAPAN and \(^2\)ABLIC Inc., JAPAN

### Zero-Power Devices and Systems

**PW-02a**  
A MECHANICALLY TUNABLE GHZ PASSIVE VOLTAGE ELEMENT USING MICROSTRIP RESONATOR  
D. Ni, A. Ravi, K.B. VinayaKumar, and A. Lal  
Cornell University, USA

### b - BIOCHEMICAL AND BIO-INSPIRED POWER/ENERGY SYSTEMS

#### Biochemical and Bio-Inspired Power/Energy Systems

**PW-03b**  
A DIATOM INSPIRED NEAR INFRARED METAMATERIAL ABSORBER WITH HIERARCHICAL NANODISK ARRAYS  
A. Li\(^1\), X. Zhao\(^1\), S. Anderson\(^2\), and X. Zhang\(^1\)  
\(^1\)Boston University, USA and \(^2\)Boston University Medical Center, USA

**PW-04b**  
ANODE BASED ON ALCOHOL DEHYDROGENASE ENZYME AND TITANIUM DIOXIDE NANOTUBES FOR PHOTOCATALYTIC MICROFLUIDIC DEVICE  
J. Galindo-de-la-Rosa\(^1\), G. González-Solano\(^2\), J.A. Diaz-Real\(^3\),  
J. Ledesma-García\(^2\), and L.G. Arriaga\(^1\)  
\(^1\)Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO,  
\(^2\)Universidad Autónoma de Querétaro, MEXICO, and  
\(^3\)University of British Columbia, CANADA

**PW-05b**  
IMMOBILIZATION OF GLUCOSE OXIDASE ENZYME ON NIAL-LDHS FOR APPLICATION IN MICROFLUIDIC FUEL CELL AND SEROTONIN DETECTION  
J. Galindo-de-la-Rosa\(^1\), M.G. Araiza-Ramírez\(^2\), A. Hernández-Torres\(^2\),  
J. Ledesma-García\(^2\), and L.G. Arriaga\(^1\)  
\(^1\)Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO and \(^2\)Universidad Autónoma de Querétaro, MEXICO
**c - DIRECT THERMAL ENERGY-HARVESTING**

**Thermoelectric Energy-Harvesting**

PW-06c  DEVELOPMENT OF THERMOELECTRIC THIN FILMS AND CHARACTERIZATION METHODS
T. Mori¹, T. Aizawa¹, S. Mitani¹, N. Tsujii¹, I. Ohkubo¹, T. Tynell¹, Y. Kakefuda¹, T. Baba¹, M. Mitome¹, N. Kawamoto¹, and D. Golberg¹
¹National Institute for Materials Science (NIMS), JAPAN and ²University of Tsukuba, JAPAN

PW-07c  METAL-METAL THERMOELECTRIC HARVESTER
E. Köhler and P. Enoksson
Chalmers University of Technology, SWEDEN

PW-08c  PRINTED THERMOELECTRIC DEVICE
K. Miyazaki, K. Kuriyama, and T. Yabuki
Kyushu Institute of Technology, JAPAN

**Other Energy-Harvesting**

PW-09c  ELECTRICAL MODELING AND CHARACTERIZATION OF A THERMO-MAGNETICALLY ACTIVATED PIEZOELECTRIC GENERATOR (TMAPG)
A.A. Rendon-Hernandez¹, M. Ferrari², S. Basrour¹, and V. Ferrari²
Université Grenoble Alpes, FRANCE and ²University of Brescia, ITALY

**d - ELECTRICAL ENERGY HARVESTING, MANAGEMENT, STORAGE AND TRANSFER**

**Batteries, Super-Capacitors, and Chemical Energy Storage**

PW-10d  OPTIMIZATION OF CARBON ELECTRODES FOR SOLID-STATE E-TEXTILE SUPERCAPACITORS
N. Hillier, S. Yong, and S. Beeby
University of Southampton, UK

**Power Electronics and Energy Management Circuits**

PW-11d  A TUNABLE HYBRID SSHI STRATEGY FOR PIEZOELECTRIC ENERGY HARVESTING WITH ENHANCED OFF-RESONANCE PERFORMANCES
A. Morel¹,², G. Pillonnet¹, and A. Badel²
¹University Grenoble Alpes, FRANCE and ²Université Savoie Mont Blanc, FRANCE

PW-12d  AN UP-CONVERSION MANAGEMENT CIRCUIT FOR ELECTRICAL FIELD ENERGY HARVESTER
Y.M. Wen, P. Li, T. Han, and X.J. Ji
Shanghai Jiao Tong University, CHINA

PW-13d  POWER MANAGEMENT WITH DYNAMIC POWER ADAPTATION FOR A ROTATIONAL ENERGY HARVESTER IN A MARITIME GEARBOX
J. Esch¹, D. Schilling², D. Stojakov¹, D. Hoffmann¹, and Y. Manoli¹,²
¹Hahn-Schickard, GERMANY and ²University of Freiburg, GERMANY
RF, Inductive and Acoustic Power Transfer

PW-14d  EXPERIMENTS ON A WIRELESS POWER TRANSFER SYSTEM FOR WEARABLE DEVICE WITH SOL-GEL THIN-FILM PZT
B.D. Truong¹, D. Wang², T. Xue¹, S. Trolier-McKinstry², and S. Roundy¹
¹University of Utah, USA and ²Pennsylvania State University, USA

PW-15d  REDUCING HUMAN BODY HEATING AND TEMPERATURE RISES DUE TO INDUCTIVELY-POWERED IMPLANTABLE MEDICAL DEVICES
C.H. Kwan, D.C. Yates, and P.D. Mitcheson
Imperial College London, UK

e · ELECTRON, ION, PHOTON AND RADIATION ENERGY CONVERSION
Electron, Ion and Photon Sources

PW-16e  MINIATURE, 3D-PRINTED, MONOLITHIC ARRAYS OF CORONA IONIZERS
Z. Sun and L.F. Velásquez-Garcia
Massachusetts Institute of Technology, USA

F · GENERAL
Energy Conversion Physics

PW-17f  GENERATION OF ASYMMETRIC INCOMMENSURABLE TORQUE SIGNALS
L. Kurmann¹, and J.L. Duarte²
¹University of Freiburg, GERMANY and ²Eindhoven University of Technology, THE NETHERLANDS

g · MATERIALS FOR ENERGY CONVERSION
Fabrication Technology for Power/Energy Systems

PW-18g  HIGH-RATE ETCHING OF SINGLE ORIENTED ALN FILMS BY CHLORINE-BASED INDUCTIVE COUPLED PLASMA FOR VIBRATIONAL ENERGY HARVESTERS
H.H. Nguyen, L.V. Minh, and H. Kuwano
Tohoku University, JAPAN

PW-19g  USING GALISTAN TO FABRICATE POROUS GOLD ELECTRODES: TOWARD NON-ENZYMATIC GLUCOSE FUEL CELLS WITH ENHANCED PERFORMANCE FOR DRIVING WEARABLE/BIOELECTRONIC DEVICES
D. Desmaële¹, F. La Malfa¹,², F. Rizzi¹, A. Qualtieri¹, M. Di Lorenzo³, and M. De Vittorio¹,²
¹Istituto Italiano de Tecnologies (IIT), ITALY, ²Università del Salento, ITALY, and ³University of Bath, UK

Materials for Energy Conversion and Storage

PW-20g  GRAPHENE-POREUS SEMICONDUCTOR NANOCOMPOSITES SCALABLE SYNTHESIS FOR ENERGY APPLICATIONS
A. Dupuy, S. Sauze, M. Jellite, R. Arvinte, R. Arès, and A. Boucherif
Université de Sherbrooke, CANADA
PW-21g HYDROGEN EVOLUTION CATALYTIC PERFORMANCE OF METAL DOPED MOS₂
X. Leng¹, Y. Wang¹, and F. Wang¹,²
¹Southern University of Science and Technology, CHINA and
²Chinese Academy of Sciences, CHINA

h - MECHANICAL ENERGY HARVESTING AND ACTUATION

Mechanical Energy-Harvesting – Electromagnetic

PW-22h A CM-SCALE, LOW WIND VELOCITY AND 250° C-COMPLIANT AIRFLOW-DRIVEN HARVESTER FOR AERONAUTIC APPLICATIONS
University Grenoble Alpes, CEA-Leti, FRANCE

PW-23h A MAGNETICALLY-SPRUNG NONLINEAR RESONATOR FOR WIDEBAND VIBRATION ENERGY HARVESTING CONSISTING OF MAGNETIC COMPOSITE AND RING MAGNETS
Y. Miyata, A. Masuda, F. Zhao, and S. Ushiki
Kyoto Institute of Technology, JAPAN

PW-24h INDUSTRY 4.0-TYPE WIRELESS SENSOR APPLICATION POWERED BY A SEMI-AUTOMATICALLY DESIGNED MINI-SCALE ELECTROMAGNETIC ENERGY HARVESTER
B. Leistritz, F. Senf, E. Chervakova, S. Engelhardt, and W. Kattanek
IMMS Institut für Mikroelektronik- und Mechatronik-Systeme gemeinnützige GmbH, GERMANY

PW-25h MEMS POWER GENERATOR OPERATED BY FLUOROCARBON GAS
M. Kaneko, K. Kudo, K. Ebisawa, K. Tanaka, and F. Uchikoba
Nihon University, JAPAN

PW-26h PERFORMANCES OF A CM-SCALE WATER FLOW ENERGY HARVESTER IN REAL ENVIRONMENT FOR AUTONOMOUS FLOWMETERS
E. Saoutieff¹, P. Gasnier¹, S. Boisseau¹, J. Ojer-Aranguren², and I. Rodot³
¹University Grenoble Alpes, FRANCE, ²NAITEC, SPAIN, and ³SERM, FRANCE

PW-27h WEARABLE GENERATOR WITH ROTATING OSCILLATING MASS
M. Ortiz¹, E. Fenollal², B. Restrepo², A. Espinoza², and E. Romero²,³
¹University of Puerto Rico, USA, ²Universidad del Turabo, USA, and ³Florida Polytechnic University, USA

Mechanical Energy-Harvesting - Electrostatic

PW-28h DYNAMIC ANALYSIS OF ELECTROSTATIC ENERGY HARVESTING DEVICE WITH MULTI-STEP STRUCTURE
X. Guo¹, Y. Zhang¹, and F. Wang¹,²
¹Southern University of Science and Technology, CHINA and
²Chinese Academy of Sciences, CHINA
PW-29h  NEMS ELECTROSTATIC RF WAKEUP SWITCH WITH PT FIB CONTACT
A. Ruyack, L. Pancoast, N. Shalabi, A. Molnar, and A. Lal
Cornell University, USA

**Mechanical Energy-Harvesting – Piezoelectric**

PW-30h  AGING ASSESSMENT OF PIEZOELECTRIC ENERGY HARVESTER USING ELECTRICAL LOADS
T. Hoang, G. Ferin, C. Bantignies, B. Rosinski, P. Vince, and A. Nguyen-Dinh
Vernon S.A., FRANCE

PW-31h  EQUIVALENT CIRCUIT MODEL OF PIEZOELECTRIC VIBRATION ENERGY HARVESTERS COMPOSED OF TRAPEZOIDAL UNIMORPH CANTILEVERS
T. Umegaki, T. Ito, G. Tan, and I. Kanno
Kobe University, JAPAN

PW-32h  INTEGRATION AND CHARACTERISATION OF PIEZOELECTRIC MACRO-FIBRE COMPOSITE ON CARBON FIBRE COMPOSITE FOR VIBRATION ENERGY HARVESTING
Y. Shi, C. Piao, D. El Fadlaoui, A. Al-Saadi, and Y. Jia
University of Chester, UK

PW-33h  MEMS ENERGY HARVESTING BASED ON UNIFORM-STRESS CANTILEVER WITH MULTILAYER PZT THIN FILMS
S. Hirai, K. Kanda, T. Fujita, and K. Maenaka
University of Hyogo, JAPAN

PW-34h  OUTPUT POWER OF PIEZOELECTRIC MEMS VIBRATION ENERGY HARVESTERS UNDER RANDOM OSCILLATION
S. Murakami¹, T. Yoshimura², M. Aramaki², Y. Kanaoka¹, K. Tsuda¹, K. Satoh¹, K. Kanda³, and N. Fujimura²
¹Osaka Research Institute of Industrial Science and Technology, JAPAN, ²Osaka Prefecture University, JAPAN, and ³University of Hyogo, JAPAN

PW-35h  REACTIVE ION BEAM ETCHING OF PIEZOELECTRIC SCALN FOR BULK ACOUSTIC WAVE DEVICE APPLICATIONS
R. James, Y. Pilloux, and H. Hegde
Plasma Therm, USA

**Mechanical Energy-Harvesting - Triboelectric**

PW-36h  TRIBOELECTRIC EFFECT TO HARNESS FLUID FLOW ENERGY
R.I. Haque, A. Arafat, and D. Briand
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

**Mechanical Energy-Harvesting - Other**

PW-37h  UPPER BOUND FOR THE POWER OUTPUTS OF LINEAR VIBRATIONAL POWER HARVESTERS: TRANSLATIONAL VS. ROTATIONAL GEOMETRIES
A. Ananthakrishnan and I. Bargatin
University of Pennsylvania, USA
Motors/Generators, Pumps and Actuators

PW-38h DETERMINATION OF MECHANICAL FORCE GENERATED BY GROWING SEED IN INKJET 3D PRINTED MICRODEVICE
K. Adamski, B. Kawa, J. Dziuban, and R. Walczak
Wroclaw University of Science and Technology, POLAND

PW-39h STABILITY OF SYMMETRICAL COMB-DRIVE ACTUATOR
A. Galisultanov¹, G. Pillonnet¹, Y. Perrin¹, L. Hutin¹, P. Basset², and H. Fanet¹
¹Université Grenoble Alpes, FRANCE and ²Université Paris-Est, FRANCE

J - THERMAL AND CHEMICAL SCIENCE AND TECHNOLOGIES
FOR POWER, PROPULSION, AND COOLING

Fuel Cells, Reactors, and Combustors

PW-40j DYNAMICS OF DIRECT HYDROCARBON POLYMER ELECTROLYTE MEMBRANE FUEL CELLS
E.H. Kong, P.D. Ronney, and G.K. Surya Prakash
University of Southern California, USA

PW-41j IMPROVED SENSITIVITY OF THIN FILM SENSOR FOR HUMIDITY MEASUREMENT INSIDE A OPERATING PEMFC
N. Hasegawa, Y. Otsuki, M. Kurosu, and T. Araki
Yokohama National University, JAPAN

k – Late News

PW-42k A RESONANCE-MAINTAINING CIRCUIT FOR HIGH-EFFICIENCY ELECTRET-BASED MEMS VIBRATIONAL ENERGY HARVESTERS
H. Mitsuya¹, H. Ashizawa³, M. Morita¹, H. Homma², G. Hashiguchi³, and H. Toshiyoshi²
¹Saginomiya Seisakusho, Inc., JAPAN, ²University of Tokyo, JAPAN, and ³Shizuoka University, JAPAN

PW-43k MICROFABRICATION OF A SILICON TURBOPUMP WITH EMBEDDED THERMAL ISOLATION FOR A RANKINE MEMS HEAT ENGINE
A. Amnache and L.G. Fréchette
Université de Sherbrooke, CANADA

I – Commercial Posters – Table Top Exhibitors

PW-44l DIRECT WRITE LITHOGRAPHY FOR THE INTERNET OF THINGS
J. Sasserath and J. Drakeford
Rave N.P., USA

PW-45l REACTIVE ION BEAM ETCHING OF PIEZOELECTRIC SCALN FOR BULK ACOUSTIC WAVE DEVICE APPLICATIONS
R. James, Y. Pilloux, and H. Hegde
Plasma-Therm, LLC, USA
Poster Session B
Thursday, December 6
15:50 - 17:30
St. John’s – Halifax Room

α - APPLICATIONS AND INNOVATIONS IN MICRO ENERGY SYSTEMS

Energy-Autonomous Wireless Sensors for IoT

PT-01a MINIMIZING POWER CONSUMPTION OF LORA® AND LORAWAN FOR LOW-POWER WIRELESS SENSOR NODES
E. Bäumker, A. Miguel Garcia, and P. Woias
University of Freiburg, GERMANY

PT-02a A NARROW-BAND AND ULTRA-LOW-POWER 433 MHZ WAKE-UP RECEIVER
S. Koeble, S. Heller, and P. Woias
University of Freiburg, GERMANY

β - BIOCHEMICAL AND BIO-INSPIRED POWER/ENERGY SYSTEMS

Biochemical and Bio-Inspired Power/Energy Systems

PT-03b A PAPERTRONIC SENSING SYSTEM FOR RAPID VISUAL SCREENING OF BACTERIAL ELECTROGENICITY
M. Tahernia, M. Mohammadifar, and S. Choi
State University of New York-Binghamton, USA

PT-04b GLUCOSE OXIDASE BIOELECTRODES IN DEVICES IMPLANTED IN LIVING PLANTS FOR ENERGY APPLICATIONS
J. Galindo-de-la-Rosa¹, A. Hernández-Torres², M.G. Araiza-González²,
L.G. Arriaga¹, and J. Ledesma-García²
¹Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO
and ²Universidad Autónoma de Querétaro, MEXICO

PT-05b MICROFLUIDIC BIOFUEL CELL BASED ON CHOLESTEROL OXIDASE/LACCASE ENZYMES
J. Galindo-de-la-Rosa¹, E. Ortiz-Ortega¹, B. López-González¹, L.G. Arriaga¹, and
J. Ledesma-García²
¹Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO
and ²Universidad Autónoma de Querétaro, MEXICO

γ - DIRECT THERMAL ENERGY-HARVESTING

Thermoelectric Energy-Harvesting

PT-06c IMPROVED MICRONANOGENERATORS BASED ON SILICON COMPATIBLE MATERIALS AND PROCESSING
I. Donmez¹, M. Dolcet¹, A. Stranz¹, M. Salleras¹, L. Fonseca¹, G. Gadea²,
M. Pacios², A. Morata², and A. Tarancon²,³
¹IMB-CNMI (CSIC), SPAIN, ²IREC, SPAIN, ³ICREA, SPAIN
PT-07c  MILLIWATT POWER SUPPLY BY DYNAMIC THERMOELECTRIC HARVESTING
M.E. Kiziroglou\textsuperscript{1,2}, S.W. Wright\textsuperscript{1}, M. Shi\textsuperscript{1}, D.E. Boyle\textsuperscript{1}, Th. Becker\textsuperscript{3}, J. Evans\textsuperscript{4}, and E.M. Yeatman\textsuperscript{1}
\textsuperscript{1}Imperial College London, UK, \textsuperscript{2}ATEI Thessaloniki, GREECE, \textsuperscript{3}Natural Science and Technical Academy Isny, GERMANY, and \textsuperscript{4}University of California, Berkeley, USA

PT-08c  THIN-FILM $\pi$-TYPE MICRO TEG USING VACUUM/INSULATOR-HYBRID ISOLATION WITH CONVEX-SHAPE HOT-PLATE MODULE STRUCTURE FOR WEARABLE DEVICE APPLICATIONS
Y. Shiotsu, T. Seino, N. Chiwaki, and S. Sugahara
Tokyo Institute of Technology, JAPAN

\textit{d - ELECTRICAL ENERGY HARVESTING, MANAGEMENT, STORAGE AND TRANSFER}

\textbf{Batteries, Super-Capacitors, and Chemical Energy Storage}

PT-09d  DEVELOPMENT OF A FLEXIBLE POLY(ETHER ETHER KETONE) SUPERCAPACITOR AS ELECTROLYTE AND SEPARATOR
R. López Mayo\textsuperscript{1}, A. Rico\textsuperscript{1}, L.G. Arriaga\textsuperscript{1}, M.P. Gurrola\textsuperscript{1,2} and J. Ledesma-García\textsuperscript{2},
\textsuperscript{1}Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO and \textsuperscript{2}Universidad Autónoma de Querétaro, MEXICO

\textbf{Power Electronics and Energy Management Circuits}

PT-10d  A HIGH-EFFICIENCY MANAGEMENT CIRCUIT FOR PIEZOELECTRIC ENERGY HARVESTER
P. Li, Y.M. Wen, T. Han, and X.J. Ji
Shanghai Jiao Tong University, CHINA

PT-11d  A VOLTAGE-BOOST RECTIFIER CIRCUIT FOR ENERGY HARVESTING FROM ENVIRONMENTAL VIBRATIONS
Y. Tohyama\textsuperscript{1}, H. Honma\textsuperscript{1}, N. Ishihara\textsuperscript{2}, H. Sekiya\textsuperscript{3}, H. Toshiyoshi\textsuperscript{1}, and D. Yamane\textsuperscript{2,4}
\textsuperscript{1}University of Tokyo, JAPAN, \textsuperscript{2}Tokyo Institute of Technology, JAPAN, \textsuperscript{3}Tokyo City University, JAPAN, and \textsuperscript{4}Japan Science and Technology Agency (JST), JAPAN

PT-12d  DESIGN OF A MEMS RELAY BASED ON SOI FABRICATION TECHNOLOGY
M. Schwarz\textsuperscript{1}, F. Lambrecht\textsuperscript{1}, A. Bauer\textsuperscript{1}, and H. Seidel\textsuperscript{2}
\textsuperscript{1}Siemens AG, GERMANY and \textsuperscript{2}Saarland University, GERMANY

PT-13d  SECONDARY-SIDE DE-TUNING TO ENABLE WIDE-RANGE INDUCTIVE POWER TRANSFER FOR A WRIST WORN SENSOR
S. Burrow and L. Clare
University of Bristol, UK
**RF, Inductive and Acoustic Power Transfer**

PT-14d  SIMULATION AND MODELLING OF A SPATIALLY-EFFICIENT 3D WIRELESS POWER TRANSFER SYSTEM FOR MULTI-USER CHARGING  
H.-W. Wang¹, N.X. Wang², and J.H. Lang²  
¹Tsinghua University, CHINA and ²Massachusetts Institute of Technology, USA

**f - GENERAL**

Energy Conversion Physics

PT-15f  FEASIBILITY OF A V-SHAPED MAGNET ROTOR TO CONVERT VIBRATION INTO ROTATION  
D.J. Clarkson¹, L. Kurmann², G.N. Moubarak¹, and Y. Jia¹  
¹University of Chester, UK and ²University of Freiburg, GERMANY

**g - MATERIALS FOR ENERGY CONVERSION**

Fabrication Technology for Power/Energy Systems

PT-16g  FACILE FABRICATION OF SILICON MICRO/NANOSTRUCTURES FOR MICROELECTRODES BY SILVER-ASSISTED ETCHING USING NANO-SPONGE AS A TEMPLATE  
Y. Chen, J. Ruan, J. Huang, L. Qian, and S. Jiang  
Southwest Jiaotong University, CHINA

PT-17g  LASER-BONDING OF FEP/FEP INTERFACES FOR A FLEXIBLE MANUFACTURING PROCESS OF FERROELECTRETS  
D. Flachs, F. Emmerich, G.-L. Roth, R. Hellmann, and C. Thielemann  
University of Applied Sciences Aschaffenburg, GERMANY

**Materials for Energy Conversion and Storage**

PT-18g  ETHANOL TOLERANT CATALYST BASED IN PLATINUM AND SILVER IN GRAPHENE  
M.J. Estrada-Solís¹, B. López-González¹, M. Guerra-Balcázar², and F.M. Cuevas-Muñiz¹  
¹Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO and ²Universidad Autónoma de Querétaro, MEXICO

PT-19g  HIGHLY ORIENTED AND STRESS MODIFIED THICK ALN FILMS DEPOSITED ON LOW THERMAL EXPANSION ALLOY SUBSTRATES FOR FLEXIBLE ELECTRONICS IN HARSH ENVIRONMENT  
N. Moriwaki¹,², L.V. Minh¹, and H. Kuwano¹  
¹Tohoku University, JAPAN and ²Dai Nippon Printing Co., Ltd., JAPAN
PT-20g  PLD ELECTRODES IN A COUPLED MICROFLUIDIC FUEL CELL TO A LAB ON A CHIP SYSTEM FOR ENERGY GENERATION
B. López-González¹, J.C. Abrego-Martínez², B.S. Hernández-Sarmiento³, A. Moreno-Zuria¹,², Y. Wang², M. Mohamedi², L.G. Arriaga¹, and F.M. Cueva-Muñiz¹
¹Centro de Investigación y Desarrollo Tecnológico en Electroquímica, MEXICO, ²Institut National de la Recherche Scientifique (INRS), CANADA, and ³Instituto Tecnológico de Oaxaca, MEXICO

h - MECHANICAL ENERGY HARVESTING AND ACTUATION

Mechanical Energy-Harvesting - Electromagnetic

PT-21h  A COMPACT ELECTROMAGNETIC VIBRATION ENERGY HARVESTER WITH HIGH OUTPUT VOLTAGE
X. Wang, X. He, K. Li, and S. Jiang
Chongqing University, CHINA

PT-22h  HEATING PERFORMANCE BY AN INSOLE ENERGY HARVESTER
M.M. Rahman, S. Noh, K.H. Kim, and H. Kim
University of Utah, USA

PT-23h  INFLUENCES OF Fe-GA ALLOY CRYSTALLINITY FOR THE APPLICATION TO A MAGNETOSTRICTIVE VIBRATION ENERGY HARVESTER
M. Ito¹, T. Minamitani², and T. Ueno²
¹Central Research Institute of Electric Power Industry, JAPAN and ²Kanazawa University, JAPAN

PT-24h  PENDULUM BASE 3D PRINTED ELECTROMAGNETIC ENERGY HARVESTER
K. Adamski and R. Walczak
Wrocław University of Science and Technology, POLAND

PT-25h  SYSTEMATIC COMPARISON OF BASIC STRUCTURES FOR ELECTROMAGNETIC ENERGY HARVESTERS USING AN AUTOMATED DESIGN METHODOLOGY
B. Leistritz and W. Kattanek
IMMS Institut für Mikroelektronik- und Mechatronik-Systeme Gemeinnützige GmbH, GERMANY

Mechanical Energy-Harvesting - Electrostatic

PT-26h  DEMONSTRATION OF AN ELECTRET GENERATOR USING SELF-ASSEMBLED ELECTRET FOR ENERGY HARVESTING WITHOUT ANY CHARGING PROCESS
N. Matsuura¹, H. Ishii¹, and Y. Tanaka¹,²
¹Chiba University, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN

PT-27h  INVESTIGATION OF PARALLELLY CONNECTED MEMS ELECTROSTATIC ENERGY HARVESTERS FOR ENHANCEMENT IN POWER OUTPUT AND BANDWIDTH
J. Li, X. Tong, J. Oxaal, Z. Liu, M. Hella, and D.-A. Borca-Tasciuc
Rensselaer Polytechnic Institute, USA
PT-28h  TEXTILE BASED FERROELECTRET FOR WEARABLE ENERGY HARVESTING
J. Shi and S.P. Beeby
University of Southampton, UK

Mechanical Energy-Harvesting - Piezoelectric

PT-29h  A 120°C 20G-COMPLIANT VIBRATION ENERGY HARVESTER FOR AERONAUTIC ENVIRONMENTS
P. Gasnier¹, M. Boucaud², M. Gallardo¹, J. Willemin¹, S. Boisseau¹, A. Morel¹, D. Gibus¹, and M. Moreau³
¹University Grenoble Alpes, CEA-Leti, FRANCE, ²ABYLSEN, FRANCE, and ³SAFRAN Power Units, FRANCE

PT-30h  AN UMBRELLA-SHAPED TOPOLOGY FOR BROADBAND MEMS PIEZOELECTRIC VIBRATION ENERGY HARVESTING
Y. Jia¹,², S. Du¹, and A.A. Seshia¹
¹University of Cambridge, UK and ²University of Chester, UK

PT-31h  INCREASED PIEZOELECTRIC COUPLING FORCE IN AUTOPARAMETRIC EXCITATION HARVESTER CONNECTING TO SELF-POWERED SERIES AND PARALLEL SYNCHRONIZED SWITCH HARVESTING ON INDUCTOR (SSHI) INTERFACES
H. Asanuma, T. Komatsuzaki, and Y. lwata
Kanazawa University, JAPAN

PW-32h  MEMS MEANDER HARVESTER WITH TUNGSTEN PROOF-MASS
E. Köhler¹, P. Johannisson², D. Kolev², F. Ohlsson², P. Ågren³, J. Liljeholm³, P. Enoksson¹, and C. Rusu²
¹Chalmers University of Technology, SWEDEN, ²RISE Acreo, SWEDEN, and ³Silex Microsystems, SWEDEN

PT-33h  OMNIDIRECTIONAL LOW FREQUENCY ENERGY HARvester FOR WEARABLE APPLICATIONS
C. Ou, V. Pinrod, B. Davaji, and A. Lal
Cornell University, USA

PT-34h  POLYMER-BASED PIEZOELECTRIC ENERGY HARVESTER FOR LOW-FREQUENCY VIBRATION USING FREQUENCY UP-CONVERSION DRIVEN BY COLLISION WITH A FLEXIBLE BEAM
T. Tsukamoto¹, Y. Umino¹, K. Hashikura¹, S. Shiomi¹, K. Yamada¹, and T. Suzuki¹,²
¹Gunma University, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN

PT-35h  TEXTILE-BASED FREESTANDING TRIBOELECTRIC-LAYER NANOGENERATOR WITH ALTERNATE POSITIVE AND NEGATIVE GRATING STRUCTURE
W. Paosangthong, R. Torah, and S. Beeby
University of Southampton, UK
Motors/Generators, Pumps and Actuators

PT-36h MACROSCOPIC ACTUATION FOR DEPLOYABLE MICROVALVES: COUPLING MECHANICALLY WHILE ISOLATING THERMALLY
C. Kelly, X. Xie, A. Dodge, and C. Livermore
Northeastern University, USA

Fuel Cells, Reactors, and Combustors

PT-37j EXPERIMENTAL AND NUMERICAL INVESTIGATION OF MICRO CATALYTIC REACTOR FOR AUTOTHERMAL REFORMING USING METHANOL AND HYDROGEN PEROXIDE WITH BUILT-IN CHROME SILICIDE THERMOCOUPLE
E.S. Jung
Pusan National University, KOREA

Fuel Cells, Reactors, and Combustors

PT-38j USEFULNESS AND PERFORMANCE COMPARISON OF COMPLEX ENZYME-TYPE BIOFUEL CELL USING ELECTRODE MODIFIED WITH TWO DET-TYPE ENZYMES BY COVALENT BONDING
H. Fujita, Y. Nishioka, and S. Imai
Nihon University, JAPAN

Late News

PT-39k A PROOF-OF-CONCEPT 70 NA ECG PROCESSOR FOR REAL-TIME R-WAVE AND NN50 DETECTION
H. Töreyin
San Diego State University, USA

Theoretical and Experimental Investigation of a Multi-Stable Energy Harvester for Rotation Motion
X. Mei¹, S. Zhou², T. Kaizuka¹, and K. Nakano¹
¹University of Tokyo, JAPAN and ²Shizuoka University, JAPAN

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PT-41k THEORETICAL AND EXPERIMENTAL INVESTIGATION OF A MULTI-STABLE ENERGY HARVESTER FOR ROTATION MOTION
X. Mei¹, S. Zhou², T. Kaizuka¹, and K. Nakano¹
¹University of Tokyo, JAPAN and ²Northwestern Polytechnical University, CHINA

PT-42l LET NOVA WORK FOR YOU
M. Lightfoot and A. Maclin
Nova Electronic Materials, LLC, USA
PT-43I  RECENT ACHIEVEMENTS IN REACTIVE SPUTTERING OF PIEZOELECTRIC ALN AND SCALN FILMS
V. Felmetsger
OEM Group, LLC, USA

PT-44I  AN INNOVATE SULFITE GOLD PLATING PROCESS
A. Gallegos, T. Souza, T. Tyson, and L. Michaelson
Technic, USA
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