

2019 Future Energy Systems Technology Conference

Final Program

Wednesday April 10, 2019
Hilton Garden Inn, Troy, NY

Registration and Check In: 8:00am – 9:00am

Opening and Keynote: 9:00am – 10:15am

- Welcome and Introduction: Jian Sun, Director
- Keynote Speech: *Integrating High Levels of Variable Renewable Energy into Electric Power Systems*, Benjamin Kroposki, National Renewable Energy Laboratory

Parallel Oral Sessions – Part 1 (10:30am – 12:00am)

A1: Advanced Component Technologies for Electrified Transportation

Room: Sage I

Session Chair: John Glaser, Efficient Power Conversion

- a1. *Power Semiconductor Platforms – Technology and Applications*, Ted Letavic, Global Foundries
- a2. *Smart Power GaN Devices and ICs*, T. Paul Chow, RPI
- a3. *SiC Devices and Modules for Aviation Applications*, Ljubisa Stevanovic, GE Global Research Center

B1: New Materials and Designs for Solar and Wind Energy

Room: Sage II

Session Chair: Clayton Besch, NYS Innovation VC Fund

- b1. *Teepee Photonic-Crystal Based Ultra-Thin and Efficient Silicon Solar Cells*, Shawn Lin, RPI
- b2. *III-V Semiconductor-Based High Efficiency PV Cell Designs*, Partha Dutta, RPI
- b3. *New Materials and Designs for Advanced Solar Cells*, Oleg Sulima, Independent PV Consultant

C1: Renewables, Offshore Wind and Smart Grid

Room: Ferris Ballroom

Session Chair: Einar Larsen, GE Energy Consulting

- c1. *Advanced Grid Innovation Laboratory for Energy*, George Stefopoulos, NYPA

- c2. *Enabling Renewable Control Systems in Power Grids with High Renewable Penetration*, Joe Chow, RPI
- c3. *Stability and Control of High-Voltage DC Transmission Systems for Offshore Wind*, Jian Sun, RPI

Luncheon (12:00pm – 1:00pm) – 1st Floor, Ferris Ballroom

Parallel Oral Sessions – Part 2 (1:00pm – 3:00pm)

A2: Advanced Component Technologies for Electrified Transportation

Room: Sage I

Session Chair: John Glaser, Efficient Power Conversion

- a4. *Next Generation Energy Storage Materials: From Electric Mobility to Smart Grid*, Jagjit Nanda, Oak Ridge National Laboratory
- a5. *High Energy Aqueous Li-ion Batteries*, Kang Xu, US Army Research Laboratory
- a6. *Self-Heating Induced Healing of Metal Dendrites*, Nikhil Koratkar, RPI
- a7. *Ion Conducting Polymer Electrolyte Membranes for Energy Conversion Technology*, Chulsung Bae, RPI

B2: New Materials and Designs for Solar and Wind Energy

Room: Sage II

Session Chair: Clayton Besch, NYS Innovation VC Fund

- b4. *Advanced Gen-3 Concentration Solar Power Technologies and Analysis*, Emily Liu, RPI
- b5. *Taking the Duck out of Water: CSP Innovations for a Green Landscape*, Shaun Sullivan, Brayton Energy
- b6. *Latest Development in Commercial Wind Turbines*, Siddharth Ashar, GE
- b7. *Active Blade Tip for Wind Turbine Load Reduction*, Farhan Gandhi, RPI

C2: Renewables, Offshore Wind and Smart Grid

Room: Ferris Ballroom

Session Chair: Einar Larsen, GE Energy Consulting

- c4. *GE Experience in Fault-Ride-Through Testing and Model Development of Wind Turbine*, Naresh Acharya, GE Energy Consulting
- c5. *Power System Data Quality and Privacy Enhancement*, Meng Wang, RPI
- c6. *New Synchrophasor-Based Control Schemes for Autonomous Microgrid or Coordinated Transmission & Distribution Operation of DER*, Luigi Vanfretti, RPI
- c7. *Improving Probabilistic Forecasting of Wind and Solar Generation and Electrical Load*, Daniel Kirk-Davidoff, UL Renewables

Poster, Industry Exhibition (3:00pm – 6:00pm) and Reception

Hors d'oeuvres, beer and wine will be served during the reception (4:00pm – 6:00pm).

Student Poster Awards: Four posters will be selected for the Best Student Poster Awards. Each award will consist of a certificate and a cash prize of \$250. To qualify for this award, a poster must be prepared and presented by a student who is identified as the lead author. Selection of the awards will be by vote of the industry attendees. Voting will remain open until 5:00pm and winners will be announced before the conference closes.

P1: Energy Storage and Fuel Cells

- p1. *Exploiting Self-Heat in a Lithium Metal Battery for Dendrite Healing*, Prateek Hundekar, Swastik Basu, Jiaolong Pan, Stephen F. Bartolucci, Shankar Narayanan, Zhenyu Yang, Nikhil Koratkar
- p2. *Synthesis of Elastic Anionic Exchange Block Copolymers by Thiol-ene Click Reaction of Poly(styrene-*b*-butadiene-*b*-styrene)*, Stefan Turan, Sungmin Park, Chang Ryu, Chulsung Bae
- p3. *Poly(arylene)s with Pendant Quaternary Ammonium Cations for Alkaline Fuel Cell Membranes*, Ramali Chandula Walgama, Jongyeob Jeon, Chulsung Bae
- p4. *Simultaneous Post-functionalization and Crosslinking of Epoxidized SBS for Anion Exchange Membrane Fuel Cells*, Ding Tian, Chang Y. Ryu, Chulsung Bae
- p5. *Synthesis and Characterization of Anion Exchange Membranes based on Semi-Crystalline Poly (Ethylene-block-Styrene-block-Ethylene) Triblock Copolymer*, Carrie Trant, Chulsung Bae, Sangwoo Lee
- p6. *Novel Elastic Sulfonated Styrene Diene Block Copolymers for Electrochemical Hydrogen Compression*, Michael Pagels, Ibuki Hosaka, Gregory Hesler, Chulsung Bae
- p7. *Preparation of Polystyrene-*b*-poly(ethylene-co-butylene)-*b*-polystyrene based Anion Exchange Membranes by Friedel-Crafts Bromoalkylation and Crosslinking*, Jong Yeob Jeon, Sungmin Park, Ding Tian, Chulsung Bae
- p8. *Poly(1,1-diphenylethylene-*alt*-butadiene) based Ionic Polymers*, Musashi Briem, Sungmin Park, Chulsung Bae, Sangwoo Lee

P2: Photovoltaics, CSP and Semiconductor Power Devices

- p9. *Epitaxy of CdTe Thin Films on Single Crystal Graphene Buffered Amorphous Substrates*, Xin Sun, Dibyajyoti Mohanty, Zonghuan Lu, Yu Xiang, Lei Gao, Jian Shi, Lihua Zhang, Kim Kisslinger, Morris A. Washington, Gwo-Ching Wang, Toh-Ming Lu, Ishwara B. Bhat
- p10. *Design and Fabrication of Teepee Photonic Crystal for High-Efficiency Solar Cells*, Alex Kaiser, Ping Kuang, Shawn-Yu Lin
- p11. *Selective Solar Absorber Based on Nickel-Pigmented Anodic Aluminum Oxide*, Xuanjie Wang, Mei-Li Hsieh, Shawn-Yu Lin, Shankar Narayanan

- p12. *Van der Waals Epitaxy of Sb₂Se₃ Thin Films Using Graphene Buffer for Solar Cells*, Xixing Wen, Xin Sun, Zonghuan Lu, Morris Washington, Toh-Ming Lu
- p13. *Performance of Wedge-Shaped Luminescent Solar Concentrators Employing Phosphor Films*, Duncan Smith, Michael D. Hughes, Diana-Andra Borca-Tasciuc
- p14. *Development of In-Situ Corrosion Kinetics and Salt Property Measurements*, Kemal Ramic, Li Liu, Robert Hull, Jie Hou, Jinghua Feng, Prachi Pragnya, Venkata Siva Varun Sarbada
- p15. *SPICE Modeling of 3kV 4H-SiC Charge-Balanced Junction Barrier Schottky (JBS) Diodes*, Collin Hitchcock, Xiang Zhou, Reza Ghandi, Alexander Bolotnikov, T. Paul Chow
- p16. *Performance Limits of Vertical 2H-GaN of Conventional and Natural Polarization Superjunction Devices*, Xiang Zhou, Jennifer R. Howell-Clark, Zhibo Guo, T. Paul Chow
- p17. *High Temperature Reverse-Bias (HTRB) Tests on GaN Lateral HEMTs*, Xiang Zhou, Collin Hitchcock, T. Paul Chow
- p18. *Integrable Quasi-vertical GaN UMOSFETs for Power and Optoelectronic ICs*, Zhibo Guo, Collin Hitchcock, Piao Guanxi, Yoshiki Yano, Shuuichi Koseki, Toshiya Tabuchi, Koh Matsumoto, Mayank Bulsara, T. Paul Chow
- p19. *Monolithically Integrated GaN Vertical LED/Quasi-Vertical Power UMOSFET Pairs using Selective Epi Removal*, Zhibo Guo, Collin Hitchcock, Piao Guanxi, Yoshiki Yano, Shuuichi Koseki, Toshiya Tabuchi, Koh Matsumoto, Mayank Bulsara, T. Paul Chow

P3: Chemical and Biochemical Energy Conversion

- p20. *1,7- and 1,6-Regioisomers of Didodecylthio Perylene Diimides: Synthesis, Separation, Characterization, and Comparison of Optical Properties*, Adrian J. Rives, Zhaorui Huang, Nathaniel T. Anderson, Peter H. Dinolfo
- p21. *The High-resolution Electronic Structure of the Reduced A₀ Cofactor of Photosystem I*, Philip Charles, Vidmantas Kalendra, S. Hao, J. H. Golbeck, K. V. Lakshmi
- p22. *Understanding the Mechanism of Proton-Coupled Electron Transfer in BiP-PF10 as a Mediator for Solar Water Oxidation*, William Marshall, Brian Mark, Vidmantas Kalendra, Dalvin D. Mendez-Hernandez, Oleg G. Poluektov, Thomas A. Moore, Ana L. Moore, K. V. Lakshmi
- p23. *The Mechanism of Binding of a Substrate Analog in the Solar Water Oxidation Reaction of Photosystem II*, Vidmantas Kalendra, G. Banerjee, I. Ghosh, K. Yang, V. S. Batista, G. W. Brudvig, K. V. Lakshmi
- ~~p24. *Understanding the Mechanism of Proton-Coupled Electron Transfer in BiP-PF10 as a Mediator for Solar Water Oxidation*, William Marshall, K. V. Lakshmi, Vidmantas Kalendra (duplicate of p22)~~

- p25. *Determining the Structure of Higher-oxidation Photochemical Intermediates of the Solar Water-splitting Reaction of Photosystem II*, Deanna Luneau, Vidmantas Kalendra, K. V. Lakshmi
- p26. *Origin of Stress in SiO₂ Optical Fibers*, Bronson Hausmann, Paul Miller, Emily M. Aaldenberg, Terry Blanchet, Minoru Tomozawa
- p27. *Morphology-Controlled Growth Of 2D Perovskite Nanowires for Polarized Light Detection*, Debjit Ghoshal, Tianmeng Wang, Nikhil Koratkar, Su-Fei Shi

P4: Wind Turbine Technology and Offshore Wind

- p28. *Load Alleviation on Wind Turbines using Camber Morphing Blade Tip*, Etana Ferede, Farhan Gandhi
- p29. *Smart Blades to Enhance Wind Turbine Performance*, Thomas T. Rice, Alison Goldsmith, Michael Amitay
- p30. *Improving Energy Efficiency in Air Separation Units and Steel-Manufacturing - A Smart-Manufacturing Solution*, Shu Yang, Sambit Ghosh, Andreas Rebmann, B. Wayne Bequette
- p31. *Wind Blade Recycling*, Cecilia Briggi, Stephen Chan, Raymond Chien, Buhan Jiang, Joshua Ling, Cody Madigan, Jonathan Mazur, Yifan Yao
- p32. *Small-Signal Characterization of Type-III Turbines for Wind Farm System Stability Studies*, Ignacio Vieto, Jian Sun
- p33. *Wind Farm System Stability and Resonance Analysis by Impedance Methods*, Ignacio Vieto, Jian Sun
- p34. *Offshore Wind with HVDC Transmission System Studies by Real-Time Simulation*, Pengxiang Huang, Ignacio Vieto, Hamed Nademi, Jian Sun

P5: Power Systems and Smart Grids

- p35. *Estimation of Generator Control System Performance Using Synchrophasor Data*, Christoph Lackner, Joe H. Chow, F. Wilches-Bernal
- p36. *Power System State Estimation under Model Uncertainty*, Saurabh Sihag, Ali Tajer
- p37. *A Reconfigurable Hardware Prototype for Pre-Compliance Testing of Phasor Measurement Units*, Prottay M. Adhikari, Luigi Vanfretti, Hossein Hooshyar
- p38. *Speeding Up the Dissipating Energy Flow Based Oscillation Source Detection*, Stavros Konstantinopoulos, Christoph Lackner, Joe H. Chow
- p39. *Overcurrent Relay Modeling Using Modelica with Cross-Verification Against a Validated Model*, Manuel Navarro Catalan, Luigi Vanfretti
- p40. *Modeling and Simulation of a Micro-grid with Photovoltaic Modules Connected to the Grid*, Marcelo de Castro Fernandes, Luigi Vanfretti
- p41. *Hybrid Islanding-Detection Method for PV Inverter*, Mehmet Ali Ozcelik, Hamed Nademi, Jian Sun
- p42. *Fault Transience and Stability Analysis of MMC-Based MVDC Systems*, Yafang Tang, Hamed Nademi, Jian Sun

- p43. *Renewable Energy System Studies by Real Time and Hardware-in-the Loop Simulation*, Hamed Nademi, Jian Sun
- p44. *Evaluation of Utility Breaker Reclosing Impacts on Distribution System Voltages*, Hamed Nademi, Jian Sun, Michael Ruppert
- p45. *Hardware-in-the-Loop Study of Islanding, 3V0 and 3I0 with DER Interconnection*, Huan Guo, Jian Sun, Ricardo Austria, Ketut Dartawan
- p46. *Active Sensing for Anomaly Detection in Power Systems*, Javad Heydari, Ali Tajer
- p47. *Identifying Overlapping Successive Events Using a Shallow Convolutional Neural Network*, Wenting Li, Meng Wang
- p48. *Simultaneous Achievement of Power Usage Data Privacy and Information Accuracy*, Ren Wang, Meng Wang, Jinjun Xiong

P6: Energy Efficiency

- p49. *Field Evaluation of Two Connected LED Lighting Systems Approaches*, Nadarajah Narendran, Indika U. Perera, Jennifer Brons, Jean Paul Freyssonier
- p50. *Clean Energy and Smart Manufacturing Innovation Institute - A New Paradigm in Manufacturing*, Sambit Ghosh, Andreas Rebmann, Shu Yang, B. Wayne Bequette
- p51. *Drag Reduction of a Semi-tractor Trailer Model Through Synthetic Jet Flow Control*, Keith Taylor
- p52. *An Automated Place and Route Methodology for Asynchronous SFQ Circuit Design*, Sagnik Nath, Kurt English, Alexander Derrickson, Andrew Haslam, John F. McDonald
- p53. *Investigation of Parallel-Connected MEMS Electrostatic Energy Harvester for Enhancing Output Power Over a Wide Frequency Range*, Jinglun Li, Xing Tong, John Oxaal, Zhenming Liu, Mona Hella, Diana Borca-Tasciuc

Industry Exhibition: The following companies and organizations will exhibit their technologies and collaboration with CFES at the conference.

Advanced Polymer Sales, LLC
Apex Solar Power
Applied Power Systems, Inc.
Armstrong Material Solutions, LLC
BioChemInsights, Inc.
Blasch Precision Ceramics, Inc.
Center for Economic Growth (CEG)
Chroma Systems Solutions, Inc.
Combined Energies, LLC
Custom Electronics, Inc.
EcoCeramics, Inc.

EnerMat Technologies Inc.
Green Power Tower Energy, LLC
MicrOrganic Technologies, Inc.
Opal-RT Technologies, Inc.
ORION Polymer, Inc.
Peaker Services, Inc.
Pterra, LLC
ReWire Energy Group, LLC
Self Array, Inc.
StorEn Technologies, Inc.



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Orion Polymer

