



UNIVERSITY OF CALIFORNIA, RIVERSIDE



Winston Chung
Global Energy Center

Energy Storage Technologies & Applications Conference

Winston Chung Global Energy Center

Bourns Technology Center

Friday, April 13, 2018

Welcome from the Conference Organizing Committee



Dr. Hossein Akhavan Hejazi
Conference Committee Chair



Dr. Hamidreza Nazaripouya
Conference Committee Co-chair

On behalf of all the conference committee, we would like to thank you for participating at this 2018 Energy Storage Technologies and Applications Conference. We are greatly excited to share and know more about the transformative advances that have been emerging in the recent past, on adopting new applications, services, and values that are achieved with a growing spectrum of innovative energy storage technologies.

We are glad to be the host of many frontiers from different parties that all have key roles in making the “clean and efficient energy” a reality. We have here experts on policy and regulatory, public and investor-owned utilities, technology developers, community leaders, academics, researchers, and students. We hope that this breadth of expertise to bring an active and fruitful dialogue, and a basis for new opportunities for all parties. We have made our efforts to have the contents of this program inclusive and beneficial to all of our broad audience and participants.

We would like to thank the programming committee for their inputs on the technical topics of this current program. We would like to give our special thanks to all the conference speakers and panelist that are contributing to this program and showed us a strong and kind support. Finally and foremost, we are very grateful to all individuals and parties who participated and contributed to this event. The committee is very grateful to you and is kindly encouraging you to share your expertise through formal and informal discussions and interactions with your peers and colleagues.

This conference is the first of many conferences that UC Riverside and the Winston Chung Global Energy Center will host. We wish and request your suggestions, inputs, and support in this effort and we sure hope to be your host in our future events.

Summary of 2018 Program

In this year of conference, the organizers has put in all the effort to hold active technical discussions inclusive of faculty, researchers, regulators, technology developers, community leaders, and utility/ISO experts. The conference includes invited and contributed presentations, panel discussions, industry showcases, poster contest, and networking reception. The theme of the conference focus on two pillars of energy storage technologies as well as system integration, operation, and business models for energy storage across a variety of applications. The highlights of discussions in this year include but not limited to:

- **Impact of California Energy Storage Policies and Activities on Recent Growth in the Energy Storage Market**
- **California Rule 21 and IEEE 1547- 2018 Standards for Energy Storage Integration**
- **Current and Future Horizon for Energy Storage Industry**
- **Grid Integration and Applications of Battery Energy Storage**
- **Alternative and Innovative Energy Storage Technologies**
- **Latest Advances and Next Generation of Battery Energy Storage**

We hope that you will enjoy your day at the Winston Chung Global Energy Center and the Energy Storage Technologies & Applications Conference. Thank you for being a part of this special day!

Energy Storage Technologies & Applications Conference

Program Agenda

Breakfast & Registration

Welcome Address & Introductory Remarks

Keynote Presentation

Mike Gravely, California Energy Commission: *“How California Energy Storage Policies and Activities Are Impacting the Recent Growth in the Energy Storage Market”*

Presentation Session 1: Current & Future Horizon for Energy Storage Industry

The speakers will discuss the current state and the roadmap for adoption of energy storage technologies. The discussions will include the current challenges facing this industry and the path to effectively overcome the barriers, as well as the opportunities for energy storage and the role of policy, technology, and business advancements for accelerating the energy storage market, and grow its benefits.

Rahul Chopra - Sr. Advisor/Program Development Specialist, Energy Technologies Area, Lawrence Berkeley National Laboratory- Leader, Grid Integration Group Energy Storage & Distributed Resources Division - Lawrence Berkeley National Lab: *“Energy Storage – Disrupter of energy sector”*

Ed Cortez - Principal Electrical Engineer – Riverside Public Utilities: *“Energy Storage at Riverside Public Utilities”*

Morning Break and Poster Presentations

Panel 1: Grid Integration and Applications of Battery Energy Storage

The speakers will discuss their experiences and viewpoints on successful implementations, the promising applications, emerging markets, significant values, and innovative advancements in integration of energy storage technologies. The discussions will also include the breakthroughs that enhance the performance, lower the costs, and improve the economics of energy storage.

Moderator **Erik Bakke - Sr. Account Executive, EnerNOC, an Enel Group Company**

Panelists **Daniel Elliott - President and CEO – Enerblu:** *“A Vision for New Energy”*

Michael Lee - Business Development Manager – Smarter Grid Solutions: *“A case study of control systems that enable value-stacking with multiple stakeholders”.*

Seyed Madaeni - Senior Director of Energy Market Trading -Advanced Microgrid Solutions: *“Integration of DERs in Competitive Electricity Markets”*

Antonio Tong - Energy Storage Integration Leader at University of California, San Diego, Center for Energy Research: *“Energy Storage Systems Integration, Testing and Valuation at UC San Diego”*

Lunch and Poster Presentations

Presentation Session 2: Efforts in Enhanced Energy Storage Operation & Safety

The speaker will present and discuss various innovative monitoring, controls, and operation management methods and technologies and standards, to improve the capabilities of energy storage systems, cycling and life extension of batteries and other energy storage, and enhance safety.

Richard Bravo, Southern California Edison: *“Storage Smart Functions”*

Panel 2: Alternative and Innovative Energy Storage Technologies

The speakers will discuss their achievements in developing, demonstrating, and commercializing novel technologies of alternative energy storage, including fuel cells, thermal storage, compressed air energy storage, super-capacitors and other non-battery-based energy storage technologies.

Moderator **Jin Noh - Policy Manager- California Energy Storage Alliance**

Panelists: **Marcel Christians – Chief Technology Officer - ICE Energy:** *“Controlling Peak Demand using thermal energy storage”*

Matt Gregori - Technology Development Manager – Southern California Gas Company: *“Power-to-Gas: California’s Trillion Dollar Storage Solution.”*

Pirouz Kavehpour - Professor and Vice-Chairman of MAE Department, UCLA: *“Compressed Air Energy Storage (CAES): Challenges and promises”*

David Lentsch – Sr. Manager, Energy Storage, Maxwell Technologies: *“Practical Use of Supercapacitors for Grid and Microgrid Energy Storage”*

Afternoon Break and Poster Presentations

Panel 3: Latest Advances and Next Generation of Battery Energy Storage

The Speakers will present and discuss various innovative technologies, materials, and processes to improve the characteristics, performance, and costs of battery energy storage technologies based on their applications in different industry sectors.

Moderator **Dr. Juchen Guo – Associate Professor- University of California, Riverside**

Panelists: **Will West – Technologist, Electrochemical Technologies Group, Jet Propulsion Laboratory (CA Institute of Technology):** *“Energy Storage and Conversion Technologies for Space Applications”*

Mihri Ozkan - Frontier Fellow of National Academy of Engineering; Medalist for Engineering Science, University of California, Department of Electrical and Computer Engineering, University of California-Riverside: *“Future Outlook For Electric Vehicle Batteries: Sulfur cathode, Li-metal anode and Solid Electrolyte”*

GJ la O' - VP Technology, Primus Power: *“An Innovative Zinc Bromide Flow-Battery for Grid Scale Energy Storage”*

Sarah Tolbert – Professor, UCLA – Departments of Chemistry & Biochemistry and Materials Science & Engineering: *“Using nanoscale architectures to improve stability and power density in batteries and pseudocapacitors”*

Closing Remarks & Networking Reception

Poster Contest Awards

Conference Keynote Speaker, Presenters, Panelists, & Moderators

Keynote Speaker



Mike Gravely

*Team Leader for Energy Technology Systems Integration for
the Energy Research and Development Division,
California Energy Commission (CEC)*

Mike Gravely is the Team Leader for Energy Technology Systems Integration for the Energy Research and Development Division at the California Energy Commission. In this role, he oversees the full spectrum of research activities to improve the California Electric Grid including: implementing the California Smart Grid, assessing future energy storage needs for California, determining the benefit and value of microgrids and distributed energy resources, addressing the grid related issues associated with integrating higher concentrations of renewable, evaluating new advanced generation systems, expanding demand response solutions for California, and addressing natural gas infrastructure safety and reliability. His team is managing over \$150 million in microgrid and energy storage research and demonstration projects. In his over 15 years at the California Energy Commission, he has held key roles as a scientist, supervisor, office manager, deputy division chief and senior engineer addressing the wide range of energy issues facing California and the Nation. Over his years with the Commission, he has worked on addressing the challenges facing the electric grid as California transitions to a new world of higher and higher concentration of renewable. He has also worked actively with the government offices of the Department of Energy, Department of Defense, Department of Transportation and other state energy offices such as New York, Massachusetts, Minnesota, and Washington to share information and develop partnerships. He has had the pleasure of overseeing hundreds of research grants to move energy technologies from the laboratory to the field and eventually to commercial success.

Mike has over 30 years of engineering and integration experience in the energy, aerospace and communications fields. Prior to the Energy Commission, Mike served in executive positions in the Federal Government and private industry including managing research, testing and fielding of distributed generation and energy storage systems for the Department of Defense, addressing the business challenges of a startup energy storage company and overseeing a staffing and training company that specialized in serving the utility industry. Mike Gravely has a BSEE from the Virginia Military Institute and an MSEE from California State University at Sacramento.

Presenters, Panelists, & Moderators



Erik Bakke

*Sr. Account Executive,
EnerNOC, an Enel Group Company*

Erik develops renewable energy assets leveraging energy storage technologies for projects “behind the meter” in commercial, industrial and multi-tenant buildings.

Prior to joining Enel, Erik led solar project development in the Western U.S., providing technology and capital for distributed energy projects at EnSync Energy Systems. His expertise in power generation began with GE Energy in 1991. He has held leadership roles in the solar industry since 2006 with GE Solar, SMA, Conergy and with Sol Systems, a preeminent solar finance and development company.

As the Sales Leader for Commercial projects with SMA Solar, Erik launched large project inverter sales while creating the market for integrated power platforms on the first utility scale solar projects in Canada and the United States. As early as 2006, as the Regional Manager of Conergy’s US SunTechnics division, Erik built and led sales, engineering and project management teams to deliver turnkey solar PV systems up to 1.2 MW including the first solar-powered grocery store portfolio in California.



Richard J. Bravo

*Senior Engineer,
Southern California Edison (SCE)*

Richard is a Senior Engineer in Integrated Innovation and Modernization at Southern California Edison. He has worked on various projects including the upgrade of motor control centers for oil exploration, control systems upgrades for pipelines and truck loading racks, SCE satellite communications, SCE's Delayed Voltage Recovery project, load performance during transient conditions, and SCE solar PV inverter generation performance in distribution system. Richard graduated from California State University, Long Beach with both BSEE and MSEE. He earned a Power Systems Sequential Program Certificate from University of California in Los Angeles and holds Professional Engineer license in electrical engineering from the State of California.



Marcel Christians

*Chief Technology Officer,
Ice Energy*

Marcel serves as Ice Energy's Chief Technology Officer. He joined Ice Energy in the summer of 2015. Under Marcel's guidance, the Ice Energy product development team has expanded the product portfolio to include the Ice Bear 40, the residential Ice Bear 10 and Ice Bear 20, as well as the Polar Bear product line for refrigeration applications.

At Ice Energy, Marcel also leads efforts to promote and educate on engineering best practices, process improvements and quality standards. In addition to product development and new application efforts, he and the R&D team have extended the storage capacities of existing products while reducing product cost and footprint. Marcel is dedicated to a strategy of exhaustive innovation ensuring Ice Energy's intellectual property is fully realized to produce a comprehensive suite of energy storage, cooling and heating solutions for global residential and C&I markets.

Prior to joining Ice Energy, Marcel worked at UTC Carrier Corporation's Technology and Components Division where he designed and developed disruptive heat transfer technologies and systems for the chiller market.

Marcel holds a Ph.D. in Mechanical Engineering from the École Polytechnique Fédérale de Lausanne, in Switzerland, where he studied under the tutelage of world-renowned heat transfer expert Professor John Thome. He graduated Magna Cum Laude from the University of Pretoria, in South Africa with an M.Eng. in Mechanical Engineering.



Rahul Chopra

*Sr. Advisor/Program Development Specialist, Energy Technologies
Area, Lawrence Berkeley National Laboratory*

*Leader, Grid Integration Group, Energy Storage & Distributed
Resources Division, Lawrence Berkeley National Laboratory*

Rahul is a serial entrepreneur and a partner at Ventus Partners and advises leading Venture Capital Funds, technology incubators, and new startups in the fields of energy and telecom infrastructure, healthcare IT, and technology related business models and markets. At Lawrence Berkeley, Rahul is a Sr. Advisor for Energy Technologies Area where he focuses on Public Private Partnerships, business development, new business ideas and models, and strategic alliances across the area. As a Rockefeller Fellow and as an Advisor to the City of San Francisco's Mayor and Board, Rahul chairs the P3 Committee on Fiber Everywhere where he is responsible for fundraising and revenue for citywide fiber asset P3. In addition to serving on the Boards of multiple technology firms, start-ups, foundations and various local governments advising on city infrastructure, Rahul works closely with the leading venture and PE firms as an advisor on the west coast in diverse industries that span energy, wireless, and healthcare infrastructures creation and optimization. Having founded 2 high-tech startups and raised over \$200M in capital and completed over \$1Billion in transactions, Rahul has over 20 years of financial, transactions, corporate development and strategy expertise in launching and growing disruptive, high-tech businesses. Prior to startups, Rahul ran multiple hundred million dollar businesses at 3COM and NORTEL. Rahul is a Graduate of Columbia University and the University of California Berkeley. Patents: 2 in MIMO for wireless and Dynamic Call Control for Unified Messaging (aka Apple Visual Mail, Google Voice etc.)



Ed Cortez

*Principal Electrical Engineer,
City of Riverside – Public Utilities Department*

Ed Cortez has over 25 years of experience in electric transmission and distribution system capital improvement, reliability, automation and power quality projects. He is responsible for managing the Communications, System Planning, Substation Engineering and Protection groups for Riverside Public Utilities. Mr. Cortez directs and supervises the deployment and integration of electric systems to support the business processes related with advanced grid technologies and system reliability. He is also responsible for the development and implementation of goals, objectives, policies and priorities of Riverside Public Utilities.

He previously worked for DNV GL and was the technical lead in providing engineering and application support utilizing the Synergi Electric software products on a global basis. He has broad integration experience in the delivery of implementation services for GIS, CIS, OMS, SCADA, and AMI projects. He began his career with the City of Anaheim – Public Utilities, where he evaluated and recommended infrastructure improvements that met current and future needs. He graduated from California State Polytechnic University at Pomona with a Bachelor of Science degree in Electrical Engineering.



Daniel Elliott

*President & CEO,
EnerBlu, Inc.*

Daniel Elliott is the President and Chief Executive Officer of EnerBlu, Inc. a high-power electrical energy storage solution company bringing innovative technologies and products benefiting from EnerBlu's lowest manufacturing cost eLTOTM battery technology. Mr. Elliott is leading the development of a state-of-the-art gigawatt eLTO manufacturing plant on a 144-acre campus located on reclaimed coal mine land in Pikeville, Eastern Kentucky to produce systems and vehicles. These include pre-engineered hybridization and microgrid systems for stationary, utility grade grid energy storage systems, all-electric trucks, school buses and shuttle buses. Mr. Elliott is a recognized leader in business development and strategy in the sustainable energy sector. Mr. Elliott has worked with leading battery technologies for mobile and grid based systems including Ford Motor Company, DaimlerChrysler, Honda R&D, Nissan, Mitsubishi, SiemensVDO, Delphi, Magna Steyr, Bosch, Hyundai Heavy Industries, Toshiba, Coslight, Yintong Energy and others. Mr. Elliott has worked globally to identify and commercialize leading edge technologies and has led corporate M&A transactions, capital raising, technology validation, manufacturing plant construction, strategic partnership developments and other key activities associated with business success and growth. In 2008, Mr. Elliott advised President GW Bush on renewable energy for transportation; he has also won the Department of Energy's "Energy Innovators Award" for his work in rapid charging and high C rate battery technology commercialization.



Matt Gregori

*Technology Development Manager,
Southern California Gas Company*

Matt Gregori serves as a Technology Development Manager for Low Carbon Resources in the SoCalGas Research, Development, and Demonstration (RD&D) group. In this role, he seeks out new clean energy technologies that are ready for deployment at the pilot or demonstration scale. His current focus is on technologies that convert woody biomass or renewable electricity into Renewable Natural Gas for injection into the natural gas grid.

During his career in the clean energy field, Matt has built and operated various types of clean energy projects, from biodiesel production facilities to food waste anaerobic digesters.

Matt earned a B.S. in Chemistry at The California Institute of Technology and an MBA at the Anderson School of Management at UCLA.



Juchen Guo

*Assistant Professor of Chemical & Environmental
Engineering Department,
University of California, Riverside*

Juchen Guo earned his Bachelor degree from Zhejiang University in 1999 and his Ph.D. from University of Maryland in 2007, both in Chemical Engineering. From 2007 to 2012, he worked as postdoctoral researcher at University of Maryland (2007 to 2011) and Cornell University (2011 to 2012). He joined the Department of Chemical and Environmental Engineering at University of California, Riverside as an Assistant Professor in summer 2012. His research interests are interfacial phenomena and material properties in electrochemical systems including Li-ion, Li-S, and multivalent ion batteries. He is the recipient of 2014 Hellman Fellowship and 2018 NSF CAREER Award.



Pirouz Kavehpour

*Professor and Vice chairman of MAE Dept.,
University of California, Los Angeles*

Prof. H. Pirouz Kavehpour is professor and vice chairman of graduate studies in the Department of Mechanical and Aerospace Engineering at UCLA. He is also director of the Complex Fluid & Interfacial Physics Laboratory. He received his B.S from Sharif University of Technology (Tehran, Iran) in 1991, and his M.S. in 1997 at the University of Rhode Island where he investigated the heat transfer and fluid mechanics of gaseous flows in microchannels. Dr. Kavehpour performed his Ph.D. research at MIT (2003) in the Hatsopoulos Microfluids Laboratory. He stayed at MIT for his post-doctoral research on the lubricity and rheology of complex fluids in microfluidic devices and in high-speed fiber-coating processes. Prof. Kavehpour's research includes energy storage, CHP/CCHP, Microgrids and integration of renewables for low income communities. Prof. Kavehpour is fellow of ASME, and recipient of L. E. Scriven young investigator

award from the International Society of Coating Science and Technology. He is also a recipient of the Army Young Investigator award (YIP) for his research on interfacial properties of the ionic liquids with application to batteries.



Michael Lee

*Business Development Manager,
Smarter Grid Solutions*

Michael Lee is a Business Development Manager at Smarter Grid Solutions. He is a 10-year veteran of the renewable energy markets, including domestic and international project development. Prior to joining SGS, he participated in renewables + storage projects at First Wind for 15 and 10 MW batteries to integrate wind in Hawaii. At SunEdison, he worked on several DG solar + storage projects as part of the first California SGIP tranche. Michael holds a degree in finance from Ohio State University and an MBA from Harvard Business School.



David Lentsch

*Sr. Manager, Energy Storage,
Maxwell Technologies*

David Lentsch specializes in distribution, transmission and generation including utility scale renewable, alternative energy and smart grid projects. He brings experience in the planning, origination, development and implementation of electrical distribution projects, power generation, capacity and smart grid projects with major investor-owned utilities, municipal utilities and electric cooperatives, as well as industrial, commercial, governmental and institutional sectors. Mr. Lentsch's primary responsibility at Maxwell Technologies is technical marketing and business development for advanced utility energy storage systems. He is responsible for utility and partner engagement and regulatory matters. His objective is to apply Maxwell Technologies energy storage products, technologies and skills to produce effective, timely and cost-effective distribution, transmission and generation solutions that meet utility, PUC, state and federal objectives.

Prior to joining Maxwell, Mr. Lentsch held senior positions with utility energy leaders for which he led renewable and alternative energy, smart grid, and renewable energy grid integration, distributed generation and demand response initiatives. He served as Director Business Development with Gridco, Vice President with utility solar developer 8minutenergy Renewables, Director with Uni-Solar – Energy Conversion Devices, and Director at Converge (now ITRON), a supplier of energy and capacity to utilities with demand response and smart grid systems. Mr. Lentsch is known in the energy industry due his dedication, integrity and commitment to renewable generation and renewable energy integration to the grid.

Mr. Lentsch earned a Bachelor degree in Business Administration from Kent State University in Ohio where he graduated magna cum laude. He also graduated from the U.S. Naval College in where he studied electronics and physics. Mr. Lentsch is a veteran and served in the United States Coast Guard. Married with one daughter, he enjoys sailing, SCUBA diving and is an avid downhill skier.



Seyed H. Madaeni

*Sr. Director of Energy Market Trading,
Advanced Microgrid Solutions*

Dr. Seyed Madaeni is Senior Director of Electricity Market Trading at Advanced Microgrid Solutions (AMS) where he leads an engineering team focused on integrating AMS's portfolio of distributed energy resources in global wholesale electricity markets. Dr. Madaeni and team work on building engineering platforms for DER optimization, market integration and value stacking. Prior to AMS Dr. Madaeni worked at Tesla which he led electricity market participation and trading and successfully built and operationalized the trading platform for integrating world's largest li-ion battery in Australia's wholesale electricity market. Dr. Madaeni has also held Principal positions at SolarCity and Pacific Gas & Electric which he has collaborated with utilities, regulators and other stakeholders to identify opportunities to effectively integrate and leverage distributed energy resources to benefit the grid and its customers. In particular Dr. Madaeni led wholesale market design and integration for SolarCity to create market opportunities for distributed energy resources in multi-use application frameworks and at Pacific Gas & Electric led market integration and optimization to maximize value of thermal, hydro, demand response and energy storage assets. Dr. Madaeni has also published numerous academic papers in prestigious journals such as IEEE Transactions on Power Systems, Proceedings of IEEE, Energy Systems, as well as technical reports for National Renewable Energy Laboratory. Dr. Madaeni holds a B.S. and M.S. in Electrical Engineering from University of Tehran and Ph.D. in Systems Engineering (Operations Research) from The Ohio State University.



Jin Noh

*Policy Manager,
California Energy Storage Alliance (CESA)*

Jin Noh is CESA's Policy Manager and manages policy and regulatory affairs for CESA at various proceedings and initiatives at the CAISO, CPUC, and CEC. Jin currently leads CESA's efforts in energy storage planning and procurement, including market and program designs to enable utility-scale and customer-sited energy storage services. Prior to CESA, Jin worked for four years as a Research Analyst at SRI International working on a range of science, technology, and innovation consulting projects for public and private sector clients, such as the New York State Energy & Research Development Authority (NYSERDA). Jin has also worked previously with other various energy sector clients, such as Sfuncube, Sonoma Clean Power, and the Department of Energy. Jin received a B.A. in Public Policy Studies and Economics from Duke University and a M.P.P. from the University of California, Berkeley.



GJ la O'

*VP Technology,
Primus Power*

GJ la O' is a VP of Technology at Primus Power. He received the B.S. in Materials Science and Engineering from UC Berkeley in 2001 and the Ph.D. in Materials Science and Engineering from MIT in 2008. He joined Primus Power in 2009 and has been instrumental in leading the technology development of a low-cost, high-power and robust flow battery system. Primus Power's proprietary EnergyPod® flow battery employs only one tank of electrolyte solution and one pump (vs. two for others), a patented bromine electrode and zinc electrode and no separator (which typically need to be replaced in 5-10 years) – together these lower footprint, increase lifetime and reduce cost. He has published over a dozen articles in refereed journal articles in the field of electrochemistry and electrochemical energy sources and has presented at over thirty conference and industry presentations. He has 23 patents issued.



Mihri Ozkan

*Frontier Fellow of National Academy of Engineering; Medalist for
Engineering Science, University of California, Department of
Electrical and Computer Engineering,
University of California-Riverside*

Prof. Mihri Ozkan is a faculty at the Department of Electrical and Computer Engineering in UC Riverside. She completed her graduate studies at Stanford University and at UC-San Diego. She is “the Climate Action Champion” and “Change Maker Professor” of UC-Riverside. Ozkan believes that adaptation of electric vehicles by 2040 depends on improvements on affordability, battery storage capacity, and battery durability. In addition, she says this requires breakthroughs in raw materials, new battery technologies, material processing and battery manufacturing. Hence, Ozkan aims to reduce the cost of anode and cathode raw materials, use new robust and safer battery architectures and performance increase in Li-ion batteries by using renewable and recyclable resources. Her work on developing batteries using in-expensive and abundant renewable resources such as mushrooms, beach sand and diatomite fossils and waste materials such as recycled glass and plastics won Ozkan “the Top 100 Author award” from the Nature publishing group. Furthermore, her battery research is featured many times in popular news outlets such as Forbes, Guardian, New York Times, Time, BBC, TBS, Discovery News, Popular Science, Huffington Post and more. Ozkan advised about 70 graduate students, mainly PhDs. She published about 300 technical papers (Citations: 6580, H-Index: 41, i10-index: 106). She has about 12 UC patents and more than 67 patent disclosures. About 20 of her patents are licensed by the industry. She received national and international honors including; “the National Medal for Engineering Science Award” from the Society of Engineering Science, “the Frontiers of Engineering Honor” by the National Academy of Engineering, “Engineering Educator of the Year Award” by the National Engineers Council, “Young Investigator Award” by the Army Research Laboratories and “the Emerging Scholar Award” by the American Association of University Women.



Sarah Tolbert

*Professor, Departments of Chemistry & Biochemistry and
Materials Science & Engineering,
University of California, Los Angeles*

Sarah H. Tolbert is a professor in the Departments of Chemistry and Biochemistry and Materials Science and Engineering at UCLA. Prior to joining the faculty at UCLA, she received a B.S. from Yale University, a Ph.D. from U.C. Berkeley as an NSF graduate fellow, and was an NSF postdoctoral fellow at U.C. Santa Barbara. Her research focuses on controlling nanometer-scale architecture in solution-processed nanomaterials to generate unique optical, electronic, magnetic, structural, and electrochemical properties. She has published over 150 scholarly research articles. Her group specifically focuses on electrochemical energy storage (including both pseudocapacitors and batteries), solar energy harvesting, electrocatalysis, nanomagnetism, and new ultra-hard materials. She also leads a program aimed at bringing nano-concepts to schools throughout the greater LA area. Professor Tolbert is the recipient of a number of awards and honors including Fellow of the Royal Society of Chemistry, the American Chemical Society R.A. Glen Award, Closs and Barrer Lectureships at the University of Chicago and Penn. State, respectively, an Office of Naval Research Young Investigator Award, an NSF CAREER Award, a Beckman Young Investigator Award, and a Sloan Foundation Research Fellowship. She serves on the editorial advisory boards of *Chemistry of Materials*, *ACS Applied Materials and Interfaces*, and *Nanoscale Horizons*.



Antonio Tong

*R & D Engineer, Center for Energy Research
University of California San Diego*

Antonio Tong is a senior engineer at the University of California San Diego. His work is focused on battery energy storage system modeling, management, control, and their integration in conjunction with smart grid, solar PV and electrified transportation. He is serving as the principal investigator for the DoE funded ARPA-E CHARGES project, validating advanced energy storage technologies for the future utility grid. He is also affiliated with many energy storage deployments and research projects on the campus, including the BMW second life EV battery stationary storage system, the first of its kind to be deployed in the United States. Prior to that, he worked at the University of California Davis as a graduate researcher. He developed one of the first pilot systems that reuse EV batteries in a solar-storage smart home. He also led the creation of the community scale microgrid at the UC Davis Robert Mondavi Institute utilizing PV plus storage to provide renewable energy for viticulture and brewery research. He has over ten publications in battery management, smart grid, electrified vehicles, and fuel cells. Antonio Tong received his Ph.D. from the University of California-Davis and Bachelor of Science from Zhejiang University in China, both in mechanical engineering.



Will West

*Technologist, Electrochemical Technologies Group,
Jet Propulsion Laboratory (CA Institute of Technology)*

Dr. Will West is a Technologist at the Jet Propulsion Laboratory (JPL), where he works as Principal Investigator, Co-Investigator, or Task Manager for research and technology development programs related to electrochemistry and energy storage/conversion. In addition to his ongoing R&D activities, he presently serves as Cognizant Engineer for the rover and descent stage batteries on the JPL's Mars 2020 mission. He received his B.S.E. degree in Chemical Engineering, and M.S. and Ph.D. degrees in Materials Science Engineering from Arizona State University. After completing his Ph.D., Dr. West served as a Postdoctoral Scholar at Caltech and JPL. He has worked as Prototyping Co-Lead at the Joint Center for Artificial Photosynthesis (Caltech), consultant for numerous research and development firms, expert witness for the U. S. Department of Justice, lecturer at California State Polytechnic University-Pomona, and as Associate Professor at Nagoya University (Japan). He holds 31 U.S. and international patents, and is author/co-author on approximately 60 journal articles and 90 conference presentations, and co-edited/co-authored the Handbook of Solid State Batteries.

About Winston Chung Global Energy Center

The Winston Chung Global Energy Center will advance solutions for today's energy storage demands, while developing far-sighted energy storage research and energy-use strategies for tomorrow's applications. Bridging the gap between industry and academia, the center will contribute to the economic, social and environmental health of communities around the world. This innovative center will:

- Foster a premier academic environment of research and discovery in sustainable energy, with a focus on storage issues;
- Educate a diverse and distinguished engineering workforce that is dedicated to addressing global energy needs.
- Offer tools and training that will increase the capacity of public and private planners, architects, engineers, utilities and developers to design and build energy-efficient community projects;
- Reach out to global organizations and businesses as a partner in fostering clean energy storage solutions; an Inspire leadership and community action to address energy storage issues in California and the world.

Goals of the Winston Chung Global Energy Center

- Advance solutions for today's energy storage demands;
- Develop far-sighted energy storage research and energy-use strategies for tomorrow's applications;
- Educate a diverse and distinguished engineering workforce that is dedicated to addressing global energy needs;
- Offer tools and training that will increase the capacity of public and private planners, architects, engineers, utilities and developers to design and build energy-efficient community projects;
- Reach out to global organizations and businesses as a partner in fostering clean energy storage solutions; and Inspire leadership and community action to address energy storage issues in California and the world.

Winston Chung Global Energy Center Leaders



Dr. Reza Abbaschian, PhD.

Winston Chung Global Energy Center Director

Winston Chung Endowed Professor in Sustainability

Distinguished Professor, Mechanical Engineering

Director, Winston Chung Global Energy Center

Former Dean, Bourns College of Engineering

Ph.D., Materials Science and Engineering, University of California, Berkeley, 1971

Reza Abbaschian is a Distinguished Professor of Mechanical Engineering at the University of California, Riverside. From 2005 through 2016, Abbaschian served as the Dean of the Marlan and Rosemary Bourns College of Engineering and, before that, was the Vladimir A. Grodsky Professor of Materials Science and Engineering at the University of Florida where he also served as chair of the department for 16 years. During his tenure, the department moved into the top 10 in U.S. News & World Report's rankings for both undergraduate and graduate education. During his tenure at UC Riverside, engineering student enrollment nearly doubled.

Dr. Abbaschian received his Ph.D. in materials science and engineering from the University of California, Berkeley, M.S. in metallurgical engineering from Michigan Technological University, and B.S. in mining and metallurgy from Tehran University. He has published more than 250 scientific articles on subjects ranging from metal processing to composites and solidification and high temperature-high pressure growth of jewelry diamonds, which led to the formation of Gemesis Diamond Company. He has five patents, eight patent disclosures, and eight books.

Dr. Abbaschian was named an Honorary AIME Member, one of the highest honors that the Institute can bestow on an individual. In addition, he is a past president of ASM International, the largest materials society, and is a fellow of ASM, TMS and AAAS. His awards and honors include the TMS Educator Award, Structural Material Division's Distinguished Scientist/Engineer Award, TMS Leadership Award, ASEE Donald E. Marlowe Award, Davis Productivity Award of the State of Florida, Tau Beta Pi Eminent Engineer, Alpha Sigma Mu Distinguished Life Membership, and the Mayor of Riverside's Outstanding Service Award for leadership in international education.



Dr. Nosang Myung, PhD

Co-Associate Director

Professor, Chemical & Environmental Engineering

Ph.D. Chemical Engineering, University of California, Los Angeles

Professor Nosang Myung received his B.S., M.S., and Ph.D. Degree in Chemical Engineering from the University of California, Los Angeles in 1994, 1997, and 1998, respectively. He spent three years as a research engineer at the same institution. In 2001-2003, he joined MEMS group at Jet Propulsion Laboratory (JPL) as a member of engineering staff. Nanotechnology and nano- and micro-electromechanical systems (NEMS/MEMS) are fundamentally changing the way materials and devices will be produced. Myung's research interests include electrochemical nano systems (ENS) and advanced materials and process development for NEMS/MEMS including bio-MEMS. My research objective is to control nanoscale-sized features to enhance material properties and device functions beyond those that we currently

know. The ability to develop and to engineer materials at the nanoscale level and to apply their unique properties into nano or microelectromechanical systems will have great impact on technology, industry and commerce. Future advances in chemical and materials engineering such as catalysis, advanced materials, and separations will require nanometer-scaled engineering.

His research at UCLA and JPL demonstrated that electrochemical processing is a cost effective technology to produce nano-scale building blocks with precisely controlled size and composition and then assemble into structures with unique properties and functions. Specific areas of Myung's research include 1) bio/nano electrochemical sensors, 2) nanoelectronics, 3) high efficient portable power sources including micro fabricated direct methanol fuel cells (m-DMFC) and micro-batteries, 4) nano-engineered advanced materials including thermoelectric materials, battery and supercapacitor electrodes, 5) materials and process development of microelectromechanical systems (MEMS), 6) microreactor and 7) high performance nanostructured magnetic materials.



Hamed Mohsenian-Rad Ph.D.

Co-Associate Director

*Associate Professor, Electrical and Computer Engineering
Associate Director, Winston Chung Global Energy Center
Ph.D., Electrical and Computer Engineering, University of British
Columbia, Vancouver, BC, Canada, 2008*

Dr. Hamed Mohsenian-Rad is an Associate Professor of Electrical Engineering, an Associate Director of the Winston Chung Global Energy Center, and the Director of the Smart Grid Research Lab at the University of California, Riverside, CA, USA.

His research interests include modeling, data analytics, control, and optimization of power systems and smart grids. He has received the National Science Foundation (NSF) CAREER Award, a Best Paper Award from the IEEE Power and Energy Society (PES) General Meeting, and a Best Paper Award from the IEEE International Conference on Smart Grid Communications. Dr. Mohsenian-Rad has been the Primary Investigator (PI) on over 4.2 million dollars federal research grants in the field of power systems and smart grid. Two of his journal papers are among the top five most cited articles in the field of Smart Grid, each with over 1000 citations.

Dr. Mohsenian-Rad received his Ph.D. in Electrical and Computer Engineering from the University of British Columbia, Vancouver, Canada in 2008. He currently serves as an Editor for the IEEE Transactions on Smart Grid and IEEE Power Engineering Letters.



Winston Chung

Founder and Chairman of Winston Global Energy Holding, Ltd.

Winston Chung, inventor of the lithium iron phosphate battery, is the founder and chairman of Winston Global Energy Holding Ltd. The company invests, manufactures and markets energy storage solutions and lithium batteries. Winston also serves as director and chief scientist of the People's Republic of China's National 863 Lithium Battery Research and Development Center. As the major shareholder of a listed Company on the Hong Kong Stock Exchange, he leads an elite team expanding clean energy research and product development.

A child prodigy, Winston invented the Traditional Chinese Medical (TCM) pulse meter at age 12. At 13, he began to study TCM and Pharmacology. His compilation of the Meditational Flow on Acupuncture and Moxibustion was published when he was 16. At 17, he invented a 3-in-1-television system. He invented the maintenance-free lead-acid battery (1982); the plastic lithium-ion rechargeable battery (1989); the waterborne adhesive lithium-ion rechargeable battery (1995); the rare earth element lithium yttrium rechargeable battery (2001) and the rare earth element lithium-sulfur rechargeable battery (2003), which is the most advanced battery technology in the world.

Winston enjoys music, art and painting. He was born on August 10th, 1958 in Guangdong Province, China.

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