Celebrating Women in Electrochemical Sciences and Engineering (WIESE)

As the world around us ushered into *Industry 5.0,* an industrial revolution driven by the common principle of improving sustainability, climate change has emerged as one of the most pressing problems. Attaining a decarbonized infrastructure is predicated for the adoption of pragmatic solutions to combat climate change that include intermittent renewable energy sources and electrochemical energy conversion systems with the grid reliant on energy storage technologies.[1-6] Electrochemical energy systems that promise suitable scaling attributes can be harnessed across a wide range, starting from the transportation sector to stationary and portable applications, while maintaining the reliable operation in the event of fuel price spikes, supply chain shortages, power disruptions, and natural disasters, thus enhancing energy resilience. [7-9] However, this transition comes at the cost of inequitable distribution of benefits and burdens.[8] The historically marginalized communities often cannot afford or do not have access to cleaner energy sources. Electrochemical energy systems can also be scaled and sited strategically in response to local community needs, for *e.g*., where marginalized/affected communities are located, increasing availability and accessibility.[7] In these ways, electrochemical energy storage systems play an important role in promoting energy justice as schematically depicted in **Figure 1**. However, the exchange of scientific ideas and dialogue in this regard took a backseat with the onset of the COVID-19 pandemic from the beginning of 2020. The resulting crisis has tremendously impacted, *inter alia*, the socio-political scenario, economy, and livelihood of almost everyone in one way or the other. Most of the countries in the world took preventive measures to restrain the pandemic, but the long-term consequences of such undertakings were inconceivable at the beginning. The pandemic threatened to disrupt communication and collaboration among peers in the scientific community, which is one of the cruces of the scientific diaspora.[10]

Unabated spread of the pandemic led to the cancellation of in-person events such as conferences, meetings, seminars, and invited talks, which are typical avenues of collaboration, amalgamation, and networking for professors, scientists, graduate students, postdocs, and early-career researchers. However, science always finds new avenues in the face of adversity, and methods of virtual engagement were embraced in lieu of in-person engagements. A year into the pandemic, a cloud-based video and audio communication platforms became *sine qua non* for conferences and meetings. These frameworks enabled the participation of a worldwide audience from the comfort and safety of their homes, which fostered the growth of a global scientific community and enhanced scientific outreach and accessibility to an extent that was previously unfathomable.[11-14]

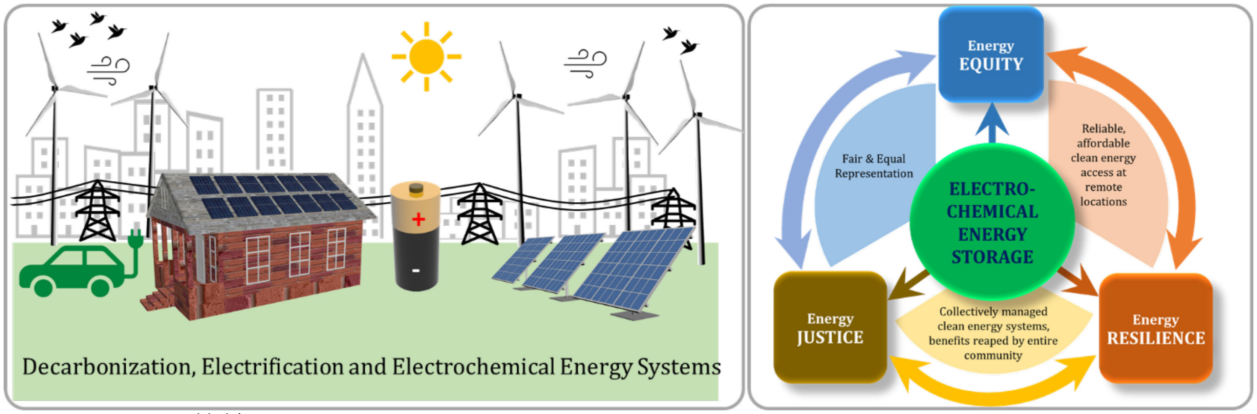


Figure 1. Electrification of industrial and transportation sectors teamed with the decarbonization of electricity generation is one of the critical routes towards the realization of a low-carbon future. Electrochemical energy systems hold the potential to address the challenges associated with intermittent renewable energy generation. Energy Storage is also intricately connected to the three pillars of the clean energy transition: Energy Equity, Justice, and Resilience. By making clean energy more available, affordable, and accessible to all, electrochemical energy storage systems enhance energy equity while also promoting inclusive energy decision-making, which strengthens the principle of energy justice.

Advances in knowledge in STEMM (science, technology, engineering, mathematics, and medicine) fields enormously benefit from the participation of a diverse population. In recent years, the number of women entering the fields of STEMM has increased; however, such advancement is very feeble, especially in these unprecedented times.[15] The unique challenges posed by this pandemic disrupted this positive momentum and threatened to undo the trajectories set up by women in science. Less access to networking events and mentoring from senior women scientists due to restricted face-to-face communication significantly affects decision-making and awareness about future career prospects and opportunities. Therefore, the need for identifying and illuminating women leaders in STEMM through virtual platforms is clear.

In order to highlight the importance of electrochemical energy storage in decarbonization while enhancing energy equity, justice and resilience, and bringing women scientists working in this field to the forefront, we, The Electrochemical Society Student Chapter at Purdue University, decided to organize a webinar series on the theme "**Women in Electrochemical Sciences & Engineering (WIESE)**". February 11 being celebrated as the International Day for Women and Girls in Science, March being recognized as Women's History Month and March 8 being celebrated as International Women's Day further strengthened our proposition. The ad hoc video conferencing tools, whose infrastructure was already laid, were further polished to make them conveniently available at everyone's disposal and immensely helped our motive. The series comprised of weekly talks by eleven women electrochemists from industry, national labs, and academia, based in the US and Europe, concluding with a symposium on "Prospects and Translation of Electrochemistry Research in Materials, Processes and Systems in Energy Storage & Conversion". The series was dedicated to highlighting the work and research journey of coveted women researchers with expertise pertaining to topical areas of energy storage and conversion.

The webinar covered a wide range of topics in the field of electrochemistry (**Table 1**). We have classified them into four broad categories: 1. Solid-State Chemistry, 2. Next-generation electrode and electrolytes, 3. Imaging Techniques and 4. Industrial approach (**Figure 2**). A summary of talks from each of these distinguished speakers has been provided below.

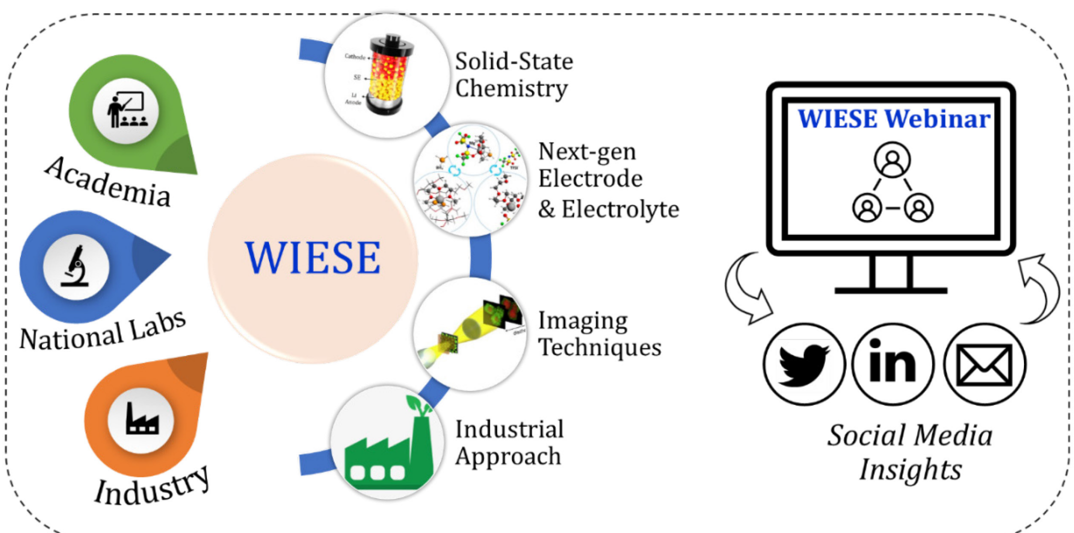


Figure 2. Overview of the WIESE Webinar. This virtual webinar series is comprised of fourteen speakers from industry, national labs, and academia presenting their views, perspectives, and research on a wide range of electrochemistry aspects. We have categorized them into four topics: Solid-State chemistry, Next-generation electrodes and electrolytes, Imaging techniques, and Industrial approach. Feedback was accepted both during the webinar and through our social media platforms to improve the quality of our events.

Solid-state chemistry:

Engineering Interfaces and Interphases for All Solid-State Batteries

Dr. Kelsey B. Hatzell, Assistant Professor of Mechanical and Aerospace Engineering and the Andlinger Center for Energy and the Environment, Princeton University *(Photo Credit: Frank Wojciechowski, Kelsey Hatzell)*

Dr. Hatzell's talk mainly addressed two issues: finding the origin of lithium filament growth in solid electrolytes and current focusing at microstructure heterogeneities. Her talk also focused on probing buried solid/solid interfaces at equilibrium and non-equilibrium states, determining whether kinetically unstable interphases drive degradation mechanisms. Through experimental techniques like X-ray attenuation and lithium metal imaging, Dr. Hatzell's group has been able to image inorganic solid electrolytes at sub-micron resolutions and obtain a spatial recognition of ionic flux in the Li metal electrode, including identifying local hotspots of high ionic flux. Dr. Hatzell also focused on the interplay of microstructure and interphase in the failure of thiophosphate solid electrolytes. Using a combination of physics-based modeling and machine learning, her group has been able to model the microstructure of these solid electrolytes and show crack structures in them.

A Traditional (Electro)chemist's Journey to working with Solid-State Batteries

Dr. Nella M. Vargas-Barbosa, Young Investigator Group Leader at IEK-12: Helmholtz Institute Münster *(Photo Courtesy: Nella M. Vargas-Barbosa)*

Dr. Vargas-Barbosa walked us through her research on electrochemical interfaces. Her undergraduate research focused on electrochemical DNA biosensors, where she studied bio-electrochemical interfaces using redox-labeled and impedance-based detection. Her PhD research was based on photoelectrocatalytic water-splitting, which is essentially ion transport in membranes to buffer electrolyte systems. The main takeaway was that pH control is a significant parameter in reducing the voltage loss during the water-splitting process, and the losses could be mitigated using a bipolar membrane. She also shed light on the wide range of systems in which electrode-ionic liquid interfaces are found, such as batteries, solar cells, fuel cells and supercapacitors, and the challenges in studying them, mentioning that electrochemical impedance spectroscopy was used to analyze the accumulation of charge at fixed potentials. As a Junior Group Leader at the Max

Planck Institute for Solid-State Research, Dr. Vargas-Barbosa now synthesizes her own materials with bulk and interfacial properties of thiophosphate solid electrolytes and photo-induced charge storage in layered materials. She emphasized how the electrode-solid electrolyte contact area in solid-state batteries was too small to produce significant currents, and presented her research in mitigating this limitation, such as investigating the variation of ionic conductivity with pressure and studying the oxidative stability of Thiophosphate electrolytes. She concluded her talk by highlighting the importance of solid-state batteries as the prime candidates among energy storage devices of the future, and the need for extensive research in this field.

> *"The Purdue ECS Student Chapter has faced the challenges of the pandemic with stride and a seamless transition from student-organized in-house seminars to fully virtual seminar series. Moreover, this chapter has managed to organize a total of 11 consecutive talks presented by female electrochemists from all over the nation, something that I have yet to see executed in any other conference/symposium/event. This speaks to the admirable tenacity of the student board members in the Purdue ECS Student Chapter. This Chapter has made all virtual talks available to the public, via active promotion and engagement in social media, which demonstrates their commitment to inclusiveness and making science accessible to all."*
>
> *-Dr. Nella Vargas-Barbosa*

Next-generation electrodes and electrolytes:

Enabling Ambient Sulfur Battery Systems through in-situ Optical Microscopy

Dr. Rachel E. Carter, Research Mechanical Engineer, US Naval Research Laboratory *(Photo Courtesy: Rachel E. Carter)*

Dr. Carter presented her research in room-temperature sodium-sulfur batteries. She also explained the particular interest in this electrode pair for low-cost, expendable, and high-energy battery applications due to its global plenitude and high energy density. She emphasized that sulfur conversion reactions exhibit different electrochemical reduction mechanisms depending on the type of electrolyte present, and in some electrolytes, conversion reaction is incomplete, yielding lower achievable capacity. Thus, she focused on developing innovative strategies such as in-situ optical cells to understand the complex reaction between sodium and sulfur and to identify an optimal electrolyte solvent. Given the better compatibility of Na metal with glymes, she

demonstrated the compatibility of these chain-like solvents (chain-like solvents, from monoglyme, diglyme, and tetraglyme) with sulfur cathodes. By observing the presence of polysulfides with distinct colors corresponding to a particular voltage profile, the overall conclusion made was that shorter solvent chain length (monoglyme) facilitated the complete electrochemical reduction of sulfur, yielding a higher discharge capacity. She also described the use of additives such as Fluoroethylene carbonate to further improve the behavior of the Na metal anode, providing an overall better performance of the sodium-sulfur cell.

"The Purdue-ECS student chapter has demonstrated exceptional performance providing relevant content and professional development to its members. It was an honor to participate as a speaker in their seminar series. I was impressed by the engagement of graduate and undergraduate students. This group facilitates not only community for Purdue's electrochemistry researchers but also mentorship and valuable career connections"

– Dr. Rachel Carter

Material Informatics for Next-Generation Batteries

Dr. Nav Nidhi Rajput, Assistant Professor, Stony Brook University *(Photo Courtesy: Nav Nidhi Rajput)*

Dr. Rajput talked about materials informatics for next-generation energy storage. The presentation was based on the necessity of clean energy to reduce the impact of climate change. The initial assumption made was that the status quo is incapable of meeting the future energy demand if our reliance is solely focused on Li-ion Batteries. These batteries are very susceptible to catching fire and are not the most economical, especially if we want to drastically change the reliability people place on natural gas. Dr. Rajput expressed her thoughts about going beyond the Li-ion front and focusing on 4 different ways to store energy – Double layer capacitor, Intercalation, Deposition/Dissolution, and Redox Flow. In analyzing intercalation, she emphasized the importance of solid electrolytes and their impact on improving the formation of dendrites, bond dissociation energies, and their improvement in the overall stability of the battery cell. She also

focused on deposition, and how the solubility impacted the efficiency of the cell, and how an improvement in the viscosity of a solvent is important when analyzing the mobility of the ions.

> *"The Purdue-ECS student chapter provides a great platform for students to get involved in learning and discussing different aspects of electrochemistry. As a seminar speaker, I truly enjoyed stimulating discussions with the students and the faculty members from different departments."– Dr. Nav Nidhi Rajput*

Li-metal Anodes cycled in High Concentration Solvate Electrolytes

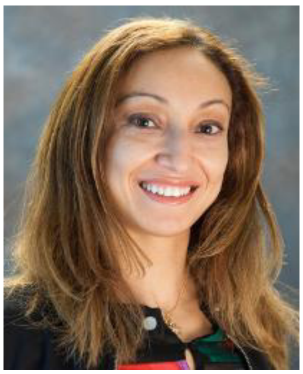
Dr. Katharine L. Harrison, Senior Member of the Technical Staff, Sandia National Laboratories *(Photo Courtesy: Katharine L. Harrison)*

Dr. Harrison's talk emphasized the motivation behind the improvement of the lithium-metal anode. The main issues that plague this type of metal anode are the implications of shorts circuits, dendrite formation, and "dead" Li. To solve these problems, applied pressure on the cell was varied in an effort to observe how the lithium metal morphology evolved. The quantifiable effects of pressure were understood to be that increasing pressure up to 1 MPa can improve morphology, cell to cell repeatability, and Coulombic efficiency. However, too much pressure (10 MPa) resulted in the signature of soft short circuits due to transport issues in the viscous electrolyte. Additionally, she talked about how cycling at high current density in solvate electrolytes can lead to the collapse of the separator. The last topic of her presentation was focused on the self-discharge of the metal anode. The self-discharge of lithium metal anodes was deemed reversible due to the recoverable coulombic efficiency shown to occur during cycling. She discussed this problem at length and concluded by suggesting that more efforts should be put towards understanding the effects of applied interfacial pressure, separator, and the self-discharge for the design of lithium-metal anodes.

> *"I was very impressed with the student leadership. The students proved to be active, engaged, and organized. Likewise, the faculty is clearly engaged and supportive of the students and this chapter."*
>
> *– Dr. Katharine Lee Harrison*

Battery Electrolytes: Key Components towards Enabling Beyond Li-ion Batteries

Dr. Rana Mohtadi, Principal Scientist, Toyota Research Institute of North America *(Photo Courtesy: Rana Mohtadi)*



Dr. Mohtadi's presentation began by describing the impact of clean energy systems given the current state of worldwide CO_2 emissions. The need to overcome this challenge and create more efficient energy storage and conversion systems is imperative to minimize global warming. Dr. Mohtadi further described how the improvement of battery chemistry beyond Li-ion has the propensity to create an effective solution to this problem. This inspired her work in the field of electrolytes, where she aims to develop Mg electrolytes to match the performance of Li-based battery electrolytes. One of the biggest differences between the two is that the solid electrolyte interphase (SEI) layer is permeable to Li^+ in Li batteries, but the similar SEI layer formed in Mg batteries is impermeable to Mg^{2+}. Therefore, the efficiency of Mg batteries quickly deteriorates. Her team's approach is to use inorganic, halogen-free single salts with high reductive stability as electrolytes. Using knowledge from Hydrogen Storage R&D, she described how she was able to create a proof of concept and able to investigate the chelating, polarity, and additive effects.

Electrochemical Capacitance under Confinement: Implications for Electrochemical Energy Storage and Conversion

Dr. Veronica Augustyn, Associate Professor of Materials Science & Engineering and University Faculty Scholar, NC State University *(Photo Courtesy: Veronica Augustyn)*

The talk by Dr. Augustyn summarized her key findings about different particles and their relation to the specific structure, interlayer spacing, and adsorption when analyzing energy storage and conversion. The dependence on confinement was understood to change how much total charge could be utilized, impacting the rate at which cycling could occur and therefore impacting the overall response of the system. The talk then went on to highlight cation adsorption at a planar

electrochemical interface and how the confinement of the particles impacted the increasing interaction present. The talk compared the planar interface to its interlayer and thoroughly analyzed how the interaction of the particles changed between both surfaces. In her final slides, she focused on the reversible structural changes present during electrochemical cycling and how these results can be used to measure the reactivity between different particle confinements.

> *"The Purdue ECS Chapter Spring 2021 Webinar Series has done a wonderful job of highlighting the work of women in the electrochemical sciences and is providing an important venue for connecting electrochemical scientists from around the world during the COVID-19 pandemic."*
>
> *– Dr. Veronica Augustyn*

Imaging Techniques:

X-ray Characterization of Batteries in Action: Morphology, Microstructure & Chemistry

Dr. Johanna Nelson Weker, Staff Scientist, Stanford Synchrotron Lightsource SLAC National Accelerator Laboratory *(Photo Courtesy: Johanna Nelson Weker)*

Dr. Weker's talk focused on using X-Ray characterization to determine chemical, structural, and morphological changes of batteries. Transmission X-Ray microscopy, or TXM allows the user to see elemental/chemical mapping and look at the sample in mosaic mode. Since intermetallics with two active alloys that lithiate at different potentials are more stable, Dr. Weker and her team have tried to dealloy excess Sn from $Sb_{20}Sn_{80}$ parent alloy. Using TXM revealed that between NP-Sn and NP-SbSn, there was a similar areal expansion, but the SnSb had more stable particle morphology. Dr. Weker's team has produced nanostructured, hybrid $NiO/Ni(OH)_2$ with porous flower-like structures. Comparing the flower hybrid with commercial NiO showed that the highest cycling performance was with the hybrid. In order to study the effect of fast-charge, diffraction testing was used to map lithium plating. The loss of Li inventory due to plating linearly correlates with fast charging capacity fade, and the loss of Li trapped as LiC_6 was found to be independent of fast charging capacity fade.

Scientific Opportunities Enabled by Current and Future Neutron Imaging Capabilities at ORNL

Dr. Hassina Bilheux, Senior Neutron Imaging Scientist, Oak Ridge National Lab (ORNL) *(Photo Courtesy: Hassina Bilheux)*

Dr. Bilheux spoke about the Scientific Opportunities Enabled by Current and Future Neutron Imaging Capabilities at ORNL. Imaging is a growing part of the ORNL neutron sciences program. The High Flux Isotope Reactor (HFIR) at ORNL is an intense steady-state neutron flux and a high-brightness cold neutron source, as well as a spallation neutron source (SNS), which is the world's most powerful accelerator-based neutron source. She explained how HFIR imaging has a broad scientific portfolio, with applications in materials science, energy materials, phase transformation/kinetics and fluids. She also expressed her thoughts on how neutron imaging allows *in-situ* and *ex-situ* spatial mapping of inhomogeneities and degradation of Li-ion battery electrodes.

Industrial perspective:

Industry Applications of Battery Engineering

Dr. Nicole Vadivel, Principal Battery Engineer, Form Energy, Inc. *(Photo Courtesy: Nicole Vadivel)*

Dr. Vadivel highlighted key aspects related to the industrial connection to electrochemical engineering. From her expertise as a battery engineer on high energy-high voltage lithium-ion batteries including silicon material technology, she demarcated the innate features of lithium-ion batteries for usage in an electric vehicle versus a grid application. For the former, the key attributes include safety, range, cost, volumetric energy density and fast charging capabilities. She also explained that the weight is not necessarily a determining factor for application in grid energy storage. The critical parameters in this context include a longer life expectancy and requirement of high total energy over fast charging. Along this direction of battery design, the crucial engineering trade-offs were emanating from an interplay of power, lifetime and energy. Introduction of new battery chemistry like extra high-energy silicon in negative electrodes can help transcend this trade-off and thus requires substantial research and high risk but allows for a greater energy range and charge rate. She also stressed upon creating a conducive atmosphere for women electrochemists both on an individual and a community level by bolstering aspirants to pursue STEM research in addition to creating resource groups.

High Energy Density Enovix Lithium-Ion Cells with Silicon Negative Electrode

Dr. Rajeswari Chandrasekaran, Test Engineering Manager, R&D team, was with Enovix
(Photo Courtesy: Rajeswari Chandrasekaran)

Dr. Chandrasekaran gave a brief overview of the technical evolution of the company Enovix, the research efforts of which are devoted towards the design and development of energy-dense lithium-ion batteries based on Silicon anode technology. The current feature involves a 3D cell architecture and boasts of superior energy density than what the baseline market has to offer. She revealed how the typical problems plaguing Silicon anodes existent in the form of high formation expansion, low formation efficiency, and cycle life were mitigated by rational engineering solutions. The talk concluded with a discussion on the future technology roadmap and a portrayal of the state-of-the-art infrastructure available in the company.

Designing, Developing, and Manufacturing State-of-the-Art Rechargeable Batteries

Dr. Amy L. Prieto, Professor of Chemistry, Colorado State University, Founder and CTO of Prieto Battery, Inc. *(Photo Courtesy: Amy L. Prieto)*

Dr. Prieto started off with the introduction of the energy-power trade-off that is existent in a lithium-ion battery system. This typically stemmed from the long-range interactions as ions move quickly across more of space wasted by a separator, but with a longer positive/negative plate, then the ions take longer to move across. The urge to create high-capacity, fast-charging batteries led her to the design of two-dimensional interdigitated electrodes. The synthesis of such electrodes can be achieved through the versatile electroplating technique. Besides being a manufacturing boon, such designs are environmentally benign as well due to the use of water as a working fluid.

Journey in Electrochemical Systems – Methods, Materials and Manufacturing at GE

Dr. Lakshmi Krishnan, Senior Scientist, Material Organization, GE Global Research *(Photo Courtesy: Lakshmi Krishnan)*

Dr. Krishnan spoke about the technical heritage of GE research and how it was unlocking solutions pertinent to the global scientific problems through an ecosystem, scaling from discovery and translating it to business. She discussed at length regarding the core of GE's innovation engine, which is built on the cross-section of several cutting-edge research disciplines, with the future drivers being energy, aviation, healthcare, and manufacturing. She talked about the past and ongoing research being performed in the energy storage and conversion sector and highlighted details about the infrastructure, including the pursuits of the modeling and testing team. The talk then expounded on her experience as a materials/electrochemical scientist in several research fronts, namely sodium metal halide battery chemistry and the development of high-performance permanent magnet materials using $SmCo_5$ nanoparticles for applications such as hybrid electric platforms. She also focused on novel manufacturing technologies such as electroless plating and electroforming that form an integral part of GE's focus area on material development.

Current Research on Lithium-ion Battery Safety at UL

Dr. Judith Jeevarajan, Corporate Fellow & Vice President of Research, Underwriters Laboratories (UL) *(Photo Courtesy: Judith Jeevarajan)*

Dr. Jeevarajan's talk emphasized on the importance of investigating thermal runaway mechanisms to build safer lithium-ion cells and batteries. The first half of her talk focused on a study on the efficacy of material combinations that can prevent thermal runaway propagation in different cell and battery designs at varying state of charge (SOC). It was observed that materials possessing high thermal conductivity are less prone to the propagation mode. In addition, it was highlighted that block/ mold performs better than interlocking separators or sleeves in curbing propagation. In the second half, she shed light on her research on counterfeit cells and batteries that reported higher rated capacity than the actual capacity. She delineated a host of physical and characterization tests as well as overcharge experiments which are necessary to be performed in order to probe any suspicious cells thus ensuring appropriate quality control.

"I would like to congratulate the excellent leadership that the Purdue University Student Chapter Officers have displayed in running this Chapter of ECS. In spite of the pandemic and the restrictions levied globally, as student leaders you initiated the virtual webinar series and successfully conducted one webinar a week. This requires significant organization and collaborative skills to bring in speakers of eminence every week. And I am very impressed that the Spring 2021 webinar series will be featuring leading women in the area of STEM under the series title of "Women in Electrochemical Sciences & Engineering (WIESE)". The intent of the student leaders of this chapter was to provide a platform to increase collaboration and networking and also learn from the experts. I am sure the expectation was more than met by the speakers you invited to the webinars. These types of events provide the students an opportunity to learn about the career choices they can make which is critical for students at both the graduate and undergraduate level. I would like to applaud your team for the outstanding skills they have shown in initiating and conducting the seminar series."

– Dr. Judy Jeevarajan

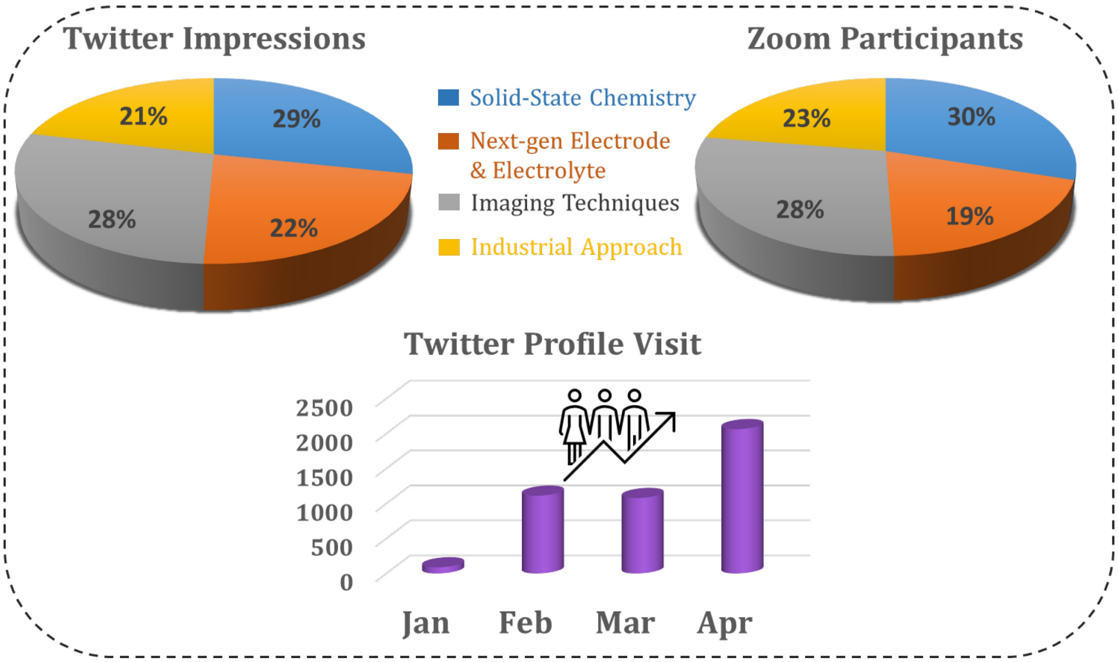


Figure 3. Social media influence on the webinar series. We leveraged the diversity of social media platforms, particularly Twitter, to increase virtual engagement in our Zoom meeting.

Reliance on social media.

Based on the success of this webinar series, we realized that social media is an integral part of the advanced learning experience during these unforeseen times. Publicizing this series on social media played a pivotal role in it being well-embraced and appreciated by a large community of professors, scientists, graduate students, and post-doctoral researchers globally. Social media enabled us to increase our outreach manifold, a task that seemed daunting and enigmatic initially. New perspectives, advice, and constructive feedback (before, during, and after the webinar) motivated us to push our boundaries and helped redesign the progression of each webinar. From the analysis of our Twitter impressions and Zoom participants in each of these categories, as shown in **Figure 3**, we observe that the percentage of participants in Zoom meetings in each category was commensurate with the percentage of Twitter impressions. Twitter propelled the visibility of the webinar series remarkably, and the number of profile visits increased to almost 95% within four months. In addition, as a courtesy to the people who could not join our events, we recorded our webinars whenever possible and uploaded them on YouTube, making quality talks by experts in this field accessible to all at no cost.

Outlook.

The goal of this webinar series was to highlight the research contributions of women scientists in electrochemical energy systems, the future of a sustainable, low-carbon world. Our aim was to promote networking, create an avenue for free exchange of ideas, and to provide a platform for those underrepresented in the scientific community at large. The series was envisaged with a broader intent to create a space for researchers, scientists, and students worldwide to discuss and disseminate their ongoing research and conceived ideas with a multi-disciplinary community of electrochemistry experts. By being able to garner a positive response, this series has already proven to be instrumental to the community by acting as a crucial resource for scientific information and networking.

Further, the trajectory of success of the distinguished speakers serves as an impetus to the upcoming researchers and bears testimony to the manifestation of woman empowerment. This facilitates in achieving another ambitious goal of the webinar series which is to motivate and advocate for women scientists and involve them in technology-mediated interactions. While we applauded the contribution of female researchers in the field of electrochemical sciences and engineering, we hope that the focus of the seminar series on women scientists would inspire new generations of women to be part of STEMM after the pandemic.

Acknowledgments

We would like to thank Dr. Kelsey Hatzell, Dr. Nella M. Vargas-Barbosa, Dr. Rachel Carter, Dr. Nav Nidhi Rajput, Dr. Katharine L. Harrison, Dr. Rana Mohtadi, Dr. Veronica Augustyn, Dr. Johanna Nelson Weker, Dr. Hassina Bilheux, Dr. Nicole Vadivel, Dr. Rajeswari Chandrasekaran, Dr. Amy L. Prieto, Dr. Lakshmi Krishnan, and Dr. Judy Jeevarajan for their contributions to the WIESE virtual webinar series. We would also like to acknowledge support in part from the National Science Foundation (NSF grants: 1805656 and 1805215), the Electrochemical Society (ECS) Student Chapter at Purdue University, and the Energy and Transport Sciences Laboratory (ETSL) in the School of Mechanical Engineering at Purdue University. Views expressed in this Energy Focus are those of the authors and not necessarily the views of the ACS. The authors declare no competing financial interest.

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Table 1. Summary of speakers in the webinar series on Women in Electrochemical Sciences and Engineering (WIESE)

Date	Speakers	Title of the talk
02/08/21	Dr. Rachel Carter	Enabling Ambient Sulfur Battery Systems through in-situ Optical Microscopy
02/15/21	Prof. Kelsey Bridget Hatzell	Engineering Interfaces and Interphases for All Solid-State Batteries
02/22/21	Prof. Nav Nidhi Rajput	Material Informatics for Next-Gen Batteries
03/08/21	Dr. Johanna Nelson Weker	X-ray characterization of batteries in action: Morphology, Microstructure & Chemistry
03/22/21	Dr. Katherine Lee Harrison	Li metal anodes cycled in high concentration solvate electrolytes
03/29/21	Dr. Nella M. Vargas Barbosa	A traditional (electro)chemist's journey to working with Solid-State Batteries
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