Energy Technology Division Graduate Student Award

Thomas Dursch earned his BS from the Department of Chemical and Biomolecular Engineering at the University of Pennsylvania. Currently, he is a fifth year PhD student in the Department of Chemical and Biomolecular Engineering at the University of California, Berkeley, co-advised by Clayton Radke (U.C. Berkeley) and Adam Weber (Lawrence Berkeley National Laboratory). His thesis title is "Ice-Crystallization Kinetics During Cold-Start of a Proton-Exchange-Membrane Fuel Cell." Aside from his doctoral work, Mr. Dursch's current research interests also include synthesis and characterization of polyelectrolyte copolymer hydrogels with application to drug delivery and soft contact lenses.

Mr. Dursch has published five peer-reviewed publications in the *Journal of The Electrochemical Society*, *Langmuir*, *Biomaterials*, and the *International Journal of Heat and Mass Transfer*; he also has three *ECS Transactions* articles. In addition, he has received several awards, including the U.C. Berkeley Dissertation Year Fellowship in 2013, the ACS Langmuir Student Award in 2012, and the ACS Award (U. Penn.) in 2009. He may be reached at tdursch@berkeley.edu.

James Radich was born and raised along the Mississippi Gulf Coast, growing up a lover of the outdoors. The wide variety of experiences in nature throughout his life spawned his passion for natural sciences and engineering. After graduating high school with special honors, Radich pursued a Bachelor's degree in chemical engineering at Mississippi State University, graduating *cum laude* with additional real-world experience earned through cooperative education program. Following graduation, Radich worked for two years as an environmental assessment/remediation regulator for the Mississippi Department of Environmental Quality, after which he took a position as Engineering Manager at a commercial bioenvironmental research laboratory working on developing sensor and *in situ* remediation technologies for some of the most challenging environmental contaminants.

In 2007, Radich pursued a Master's degree at Mississippi State University working on microbial influences on seafloor gas hydrates. After graduating with his Master's degree in 2009, Radich finally followed his passion for energy research to the University of Notre Dame, where he currently works with Prashant Kamat on graphene-based energy conversion and storage applications. Radich was also awarded the Jana and Patrick Eilers Graduate Fellowship for Sustainable Energy Research and the Bayer Environmental Research Fellowship, both in 2013-2014 academic year. Radich will graduate in May 2014 with his PhD and intends to continue research into relevant photo- and electrochemical systems.

Industrial Electrochemistry & Electrochemical Engineering Division H. H. Dow Memorial Student Achievement Award

Matthew Ward Brodt received a BS in Chemical Engineering from the University of Virginia (UVa) in 2010 and is a PhD candidate in the Peter Pintauro group in the Chemical and Biomolecular Engineering Department at Vanderbilt University. His undergraduate research included the evaluation of bimetallic nanoparticle catalysts for the production of ethanol from synthesis gas under the guidance of Robert Davis. He also participated in the Naval Research Enterprise Internship Program (NREIP) at Indian Head, MD during the summers of 2009 and 2010 where he implemented and tested a method to quickly characterize metal fuel particles for energetic applications. Brodt's present research at Vanderbilt involves electrospinning nanofiber nonwoven electrode mats that function as cathodes and anodes in high-performance membrane electrode assemblies (MEAs) for PEM hydrogen/air fuel cells. He is focused on lowering the platinum loading in MEAs while increasing power output and electrode durability. With industry collaboration, he hopes to engineer state-of-the-art electrodes that make an important impact on fuel cell vehicle commercialization.

Brodt has enjoyed contributing to the scientific community and was a founding member and editor of UVa's first engineering journal, the *Spectra Engineering and Applied Science Research Journal*. The *Spectra* reports exciting new research performed by undergraduates at UVa and is distributed to high schools in Virginia to spark students' interest in science and engineering. He has also participated in the Vanderbilt Student Volunteers for Science, an organization that gives science demonstrations to local elementary and middle schools.

Industrial Electrochemistry & Electrochemical Engineering Division Student Achievement Awards

Paul Northrup is currently finishing up his PhD in Chemical Engineering at Washington University in St. Louis (Wash U) under Venkat Subramanian. During his time at Wash U, Northrup has worked on a variety of projects related to the modeling and simulation of electrochemical systems. His reformulation of the porous electrode pseudo 2D (P2D) model using orthogonal collocation has allowed for the use of physics based models in optimization and parameter estimation routines, which require numerous simulation runs to find a solution, and to include more complex phenomena, such as thermal effects and multi-cell stacks. Furthermore, efficient battery simulation permits the inclusion of first-principle based models into battery management systems (BMS) and is part of an ARPA-E funded initiative to include the P2D model into model predictive control (MPC) schemes for improved performance in electric vehicles.

Northrup has also developed a kinetic Monte Carlo (KMC) model to study the growth and heterogeneity of the solid electrolyte interface (SEI) layer during battery charging. In addition to his battery work,

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Northrup has modeled supercapacitor performance and estimated parameters using experimental data, allowing for life studies to be performed and to examine causes of failure. Northrup has contributed to finding numerical solutions to elliptic partial differential equations using a perturbation modification to the method of false transients, resulting in a method that is more robust and can capture more solutions than traditional approaches.

Prior to his doctoral studies, Northrup graduated *summa cum laude* with a BS in Chemical Engineering from Wash U.

Vedasri Vedharathinam is currently pursuing her PhD in the Department of Chemical and Biomolecular Engineering at Ohio University, Ohio, under the guidance of Gerardine G. Botte. Vedharathinam's doctoral research focuses on developing a mechanism for the electrochemical oxidation of urea on Ni catalyst in alkaline medium. Her project involved various electrochemical and *in situ* spectroscopic techniques to determine the reaction kinetics and intermediates during the electrochemical oxidation of urea. Apart from her doctoral research, Vedharathinam is involved in the recovery of Ni-Co bimetallic catalyst from spent NiMH batteries and its application as anode catalyst in urea electrolysis for H2 production. It is an original research work in which she wrote the proposal and won the Student Enhancement Award from Ohio University, 2011.

Vedharathinam received her master's degree from the Department of Chemistry at University of Calgary, Canada and obtained her bachelor's degree in chemical and electrochemical engineering from the Central Electrochemical Research Institute (CECRI), India. Her MSc research focused on investigating possible solutions to the mechanical degradation of Ni-YSZ anode in Solid Oxide Fuel Cell (SOFC) due to redox cycling. Vedasri has published four peer reviewed journal articles and two ECS transactions. She has organized various scholarly activities in the field of electrochemistry. Vedasri took initiative and founded the "Ohio University ECS Student Chapter" and served as the President of the organization. She has successfully organized IEEE outreach programs in ECS meetings and has invited electrochemistry experts to present seminars at the departmental seminar on behalf of OU chapter.

Venkata Raviteja Yarlagadda is currently pursuing his PhD in the Department of Chemical & Petroleum Engineering at University of Kansas, Lawrence, Kansas, under the guidance of Trung Van Nguyen. He received his Bachelor degree in chemical engineering from Osmania University, India, and his masters degree from the Department of Chemical & Petroleum Engineering at University of Kansas, Lawrence (KS). Yarlagadda's masters thesis involved measuring the conductivities of molten metal oxide electrolytes and evaluating them in a Direct Carbon Fuel Cell.

Yarlagadda's PhD dissertation involves modeling and experimentally characterizing a regenerative hydrogen-bromine fuel cell system. He is currently working on developing high surface area carbon electrodes to achieve the best bromine electrode configuration in a hydrogen-bromine fuel cell.

Yarlagadda has given seven oral presentations and two poster presentations in international conferences (three of the oral presentations were given at the ECS meetings), and received a travel grant from ECS to present in the 224th meeting held at San Francisco. He has also won the best presentation award in the 4th annual Global - Center of Excellence (G-COE) international forum held at Honolulu, Hawaii. Yarlagadda can be contacted by e-mail at raviteja27@ku.edu.

Drexel University Student Chapter

The ECS Student Chapter at Drexel University, in conjunction with the Academy of Natural Sciences of Drexel University in Philadelphia, Pennsylvania, volunteered at STEM career days for middle school students across Philadelphia on November 8 and 15, 2013.

Chapter president Kelsey Hatzell, along with ECS student members and members of the Drexel Nanotechnology Institute, Boris Dyatkin, Joseph Halim, Amanda Pentecost, and Katie Van Aken, helped to organize the event, which was part of a broader STEM initiative across Philadelphia. Over a two-week period the event drew in over 1000 middle school students from the Philadelphia public, charter and parochial schools.

The middle schoolers learned about the fundamental working principles of batteries through a hands-on lemon (and a lime/potato) voltaic experiment. The demonstration emphasized how the lemon battery (lemon juice and zinc and copper metal) changes chemical energy to electrical energy, as well as the primary components of a battery. The participants were able to compare different fruit and vegetable "electrolytes" by comparing lemons, limes, and potatoes. They learned about the scientific process used every day in research and were encouraged to develop their own hypotheses about voltage change when lemons were connected in series with each other or in series with limes and potatoes. The high school students learned how to make measurements with a multimeter, and ended up estimating how many potatoes they would have to carry around to replace one AAA battery (about four or five!).

Boris Dyatkin *(background) and* **Joseph Halim** *(front) help Philadelphia high school students measure the voltage output from a lemon, and assemble a series "battery" composed of limes, lemons, and potatoes.*

Seventh graders from Eugenio Maria De Hostos Charter School in North Philadelphia use a multimeter to measure voltages in a potato.

Auburn University Student Chapter

The Auburn University Student Chapter grew this year to 14 members strong. The chapter held an election of new officers on January 24, 2014 with following results: President - Hyejin Park, Vice President - Samir Paul, Treasurer - Yoonsung Chung, and Secretary - Sangjun Fan. The faculty adviser is Jeff Fergus.

The Chapter is planning for two research presentations this semester given by member students, plus a faculty seminar, and a poster presentation. Membership in the chapter is free to ECS student members.

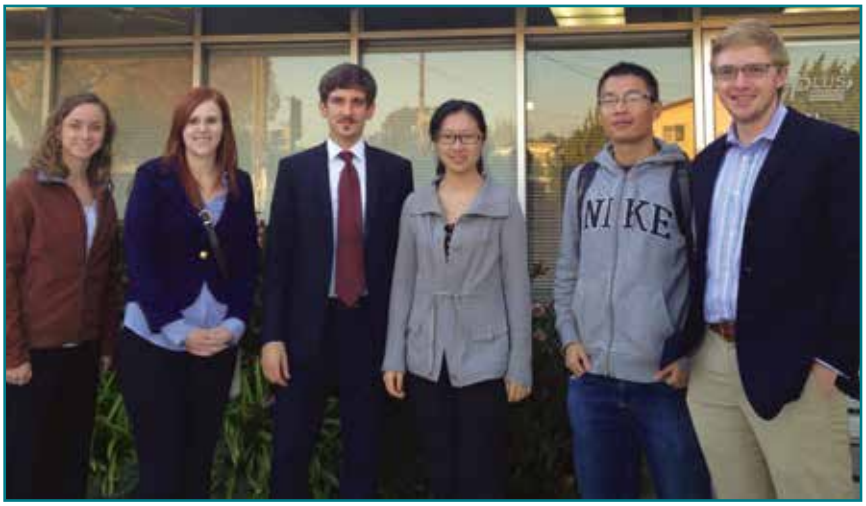
The Auburn University Student Chapter members, with their advisor **Jeff Fergus** *(standing), during the organizational meeting in January 2014.*

University of Maryland Student Chapter

The University of Maryland (UMD) Student Chapter organized local lab tours during the 224th ECS meeting in San Francisco, California. Initiated by Chapter president Colin Gore, the Chapter took advantage of the meeting proximity to Berkeley, CA and set up opportunity to see the Advanced Light Source (ALS) on the campus of Lawrence Berkeley National Lab (LBL), as well as visit PolyPlus Battery Company on the afternoon of October 30th. Students from the University of Virginia Student Chapter, the National Capital Section of ECS, and the Colorado School of Mines Chapter were invited to participate as well. Twelve students in all participated in the tours.

Doug Taube, Chemistry Laboratory Manager of the ALS, generously led the group on a tour of the facility. He began by chronicling the history of the lab and its founder, Nobel Laureate Ernest Lawrence, who invented the cyclotron in the 1930s. He closed the introductory material by describing the eventual repurposing of the facility as a synchrotron source (currently the brightest soft x-ray source in the US) in the 1980s, after its cyclotrons were decommissioned. The tour group was then led around the synchrotron and its 43 beam lines, hearing highlights of the breakthrough research occurring at several of the end stations, from surface science of advanced fuel cells at ambient pressure to 3D tomography of the xylem in drought-tolerant grape vines. Students agreed that learning about the combination of historical background and current cutting-edge science at the lab was a uniquely rewarding experience.

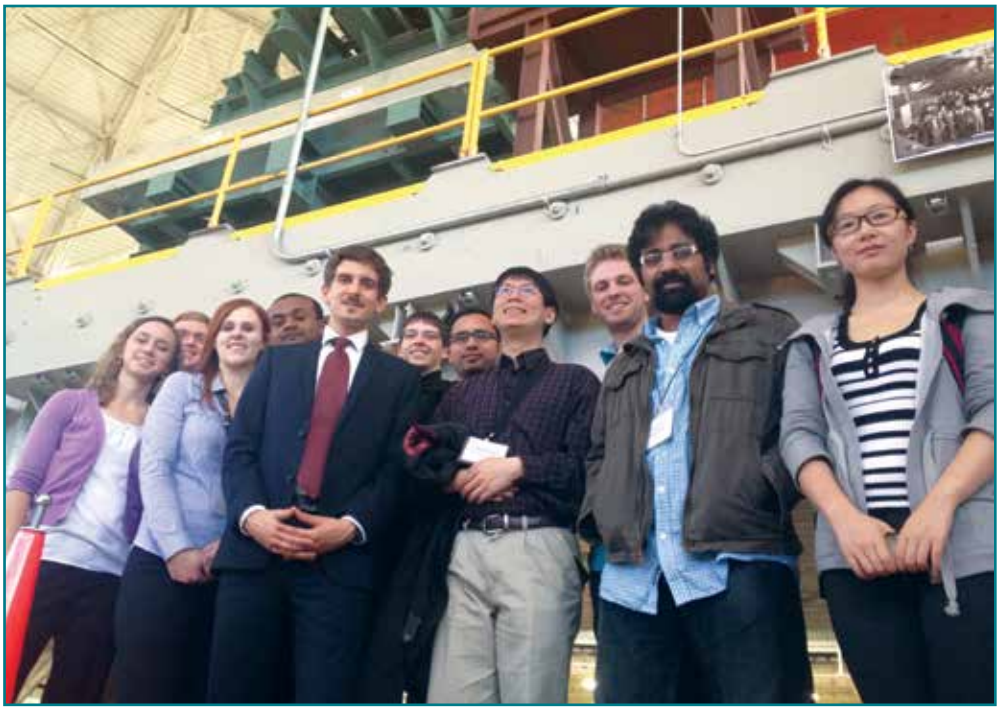
Immediately following the ALS tour, Steve Visco, CEO and CTO of PolyPlus Battery Company and former ECS High Temperature Materials Division Chair, arranged for a demonstration



Ashley Maes *(CSM Chapter President),* **Melissa Vandiver**, **Colin Gore** *(UMD Chapter President),* **Ye Liu**, **Ying Liu**, *and* **William Gibbons** *(left to right) at PolyPlus Battery Company.*

of his company's technology to the students at the PolyPlus offices only a few blocks away. The company specializes in new primary and rechargeable Li-Air, Li-Water, and Li-Sulfur battery technologies that have accumulated commendable support, including multiple ARPA-E awards. Thomas Conry, in charge of New Business Development, described the unique PolyPlus "protected Li electrode" technology and its implementation in each of their devices. As a follow-up of the group visit at Berkeley, Dr. Visco reciprocated by visiting UMD in November, where he gave a talk entitled "Roadmap to Next-Generation Batteries."

The group then caught BART back from Oakland to San Francisco to return to the conference center for the student poster sessions later that evening.



The UMD Student Chapter tour group poses under a massive electromagnet from the retired cyclotron, mimicking a photograph (top right) of Ernest Lawrence and Lab scientists from over half a century ago.

Montana State University Student Chapter

The new Student Chapter of ECS at **Montana State University** *is very excited for the semester ahead. United in a passion for science, pizza at meetings, engineering, and electrochemistry, the Chapter has organized three key committees: Fundraising, Outreach, and Recruitment. In February, the Chapter had a booth at the MSU Engineerathon and exhibited a bicycle-powered light demonstration and a fruit-battery demonstration.*

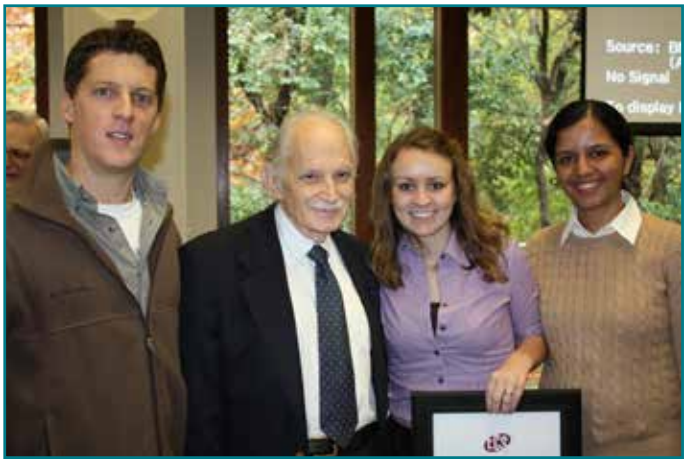
University of Texas – Austin Student Chapter

Ed. Note: *See related articles in this issue on pages 13 and 37.*

The UT-Austin Student Chapter officers with current and previous ECS officers. From left to right: **Josephine Cunningham**, **Daniel Redman**, **Fred Strieter**, **Roque Calvo,** *and* **Fernando Garzon**.

The Electrochemical Society recognized Professors Allen J. Bard and John B. Goodenough with Honorary Memberships on November 23, 2013 at their home institution, The University of Texas at Austin. Many scientific colleagues, including former graduate students and postdoctoral associates of the awardees, traveled long distances to celebrate the occasion. Professors Bard and Goodenough are now recognized as the 76th and 77th members of an exclusive group made up of some of the most prominent names in electrochemical and solid state science dating back to the late 19th century.

Arumugam Manthiram, Director of the Texas Materials Institute and Joe C. Walter Chair in Engineering, served as the host for the awards ceremony. Roque Calvo, ECS Executive Director, presented the ECS Student Chapter at The University of Texas at Austin with a 2013 ECS Student Chapter of Excellence Award and also discussed the history of the ECS Honorary Membership. Former ECS President Fernando Garzon and current ECS Vice-President Krishnan Rajeshwar presented the awards to Professors Bard and Goodenough, respectively. Both recipients delivered inspiring lectures upon reception of the award.



UT-Austin ECS student members with **Allen Bard** *with the ECS Student Chapter of Excellence award. From left to right:* **Craig Milroy**, **Allen Bard**, **Josephine Cunningham,** *and* **Preethi Mathew**.

In his lecture, Professor Bard conveyed his philosophy on the importance of fostering curiosity-driven science, rather than exclusively supporting research for a target application. He discussed three exemplary research initiatives that were conceived out of pure scientific curiosity without any foreseeable benefits to society at the time, which eventually developed into major thriving fields with tremendous societal impact. The first two examples he discussed were nuclear magnetic resonance (NMR) and light amplification by stimulated emission of radiation (the laser). Since the time of their theoretical establishment, the ongoing research and development in these fields has undoubtedly brought about great technological change. Professor Bard also discussed how the investigation of electrogenerated chemiluminescence (ECL) by his research group and his colleagues was motivated by curiosity, since the fundamental understanding of the ECL system was of utmost concern, rather than its societal impact. He stated that if someone had asked him during the early stages of the work whether or not ECL would ever have practical use in a clinical setting, he would have certainly answered "no" based on the understanding of the system at the time. ECL has since been developed for use in biomedical assays as a very sensitive and practical method of detection, which is now heavily adopted in clinical applications throughout the world.

Professor Goodenough shared his incredible life journey beginning when he was a young undergraduate majoring in mathematics and reading a considerable amount of poetry and philosophy, "searching for his calling" in life. He recalled one particular work, Alfred Whitehead's *Science in the Modern World*, as highly influential during his service in World War II as an Army Air Force meteorologist: "I came to the conclusion that, if I were ever to come back from the war and if I were to have the opportunity to go back to graduate school, I should study physics." Professor Goodenough explained how upon taking a notorious 32-hour qualifying exam, written in part by Enrico Fermi at The University of Chicago, he decided not to pursue nuclear physics, but rather to study solid-state physics under the supervision of Clarence Zener. He described the inspirational beginnings of his career at the Lincoln Laboratory at MIT, developing ferrimagnetic metal oxides for magnetic memory. His success in this research paved the way for him to focus on fundamental investigations and eventually develop the concepts of cooperative orbital ordering, also known as a cooperative Jahn-Teller distortion, and the Goodenough-Kanamori rules for magnetic interactions. Despite the fact that he had very little formal education in chemistry, Professor Goodenough's groundbreaking fundamental research had been recognized by the Inorganic Chemistry Department at the University of Oxford, offering him a position as the Head of the Department. He shared

that the decision to accept Oxford's invitation, among many other tempting offers, was facilitated by his wife, Irene. It turned out to be the right decision. At Oxford, Professor Goodenough's group experimentally identified lithium cobalt oxide as the cathode material for the Li-ion rechargeable batteries, capable of achieving high energy density without using metallic lithium as an anode. This discovery brought about the first commercialized rechargeable Li-ion batteries by Sony Corporation, used in modern handheld electronics today. Professor Goodenough concluded his lecture by stressing the urgency for developing sustainable energy and highlighted some recent findings by his group at The University of Texas at Austin regarding the development of thin membranes that block anode dendrites from reaching the cathode and allow for the alternative design of higher capacity cells.

The final speech was delivered by Larry R. Faulkner, a former graduate student of Allen Bard, past President of The Electrochemical Society (1991-1992), and past President of the University of Texas at Austin (1998-2006). Dr. Faulkner reflected on the past 50 years of electrochemistry and chemistry in general, highlighting that the greatest challenge for chemists is to manage the use and stewardship of the material world. He asked the big question, "How can we wisely make use of Earth's resources, to provide fulfilling, secure lives for the Earth's people, now and indefinitely into the future?" Dr. Faulkner concluded by noting that this year marks the 200th anniversary of Sir Humphrey Davy's greatest discovery, Michael Faraday. The two honored professors, Bard and Goodenough, have undoubtedly adopted this important lesson of Humphrey Davy toward developing younger talent and shaping the future of electrochemistry and solid state science.

As a student at The University of Texas at Austin, I can personally attest to Dr. Faulkner's comments on Professors Allen J. Bard and John B. Goodenough by observing their impact on my peers and on me as I begin my own scientific journey. I am honored to have the opportunity to be in their presence and I am fortunate to be conducting my research in an environment cultured by these great men who hold such a strong devotion to science and commitment to the prosperity of future generations.

This notice was prepared by Donald Robinson, Vice-President, UT-Austin ECS Student Chapter.

The audience during the ECS Honorary Membership Induction. First row, from left to right: **John Goodenough**, **Allen Bard**, **Fernando Garzon**, **Roque Calvo**, *and* **Krishnan Rajeshwar**. *Second row, from left to right:* **Josephine Cunningham**, **Donald Robinson**, **Alex Boika**, **Jeffrey Dick**, **Ki Min Nam**, **Byungkwon Kim**, *and* **Matthew Beaudry**.

UT-Austin ECS student members and past officers at the Honorary Membership luncheon. From left to right: **Alex Boika**, **Karen Scida**, **Netzahualcoyotl Arroyo Curras**, **Preethi Mathew**, **Craig Milroy**, *and* **Jeffrey Dick**.

Student Awards

Call for Nominations

Visit
www.electrochem.org
and click on the "Awards" link.

For details on each award—including a list of requirements for award nominees, and in some cases, a downloadable application form—please go to the ECS website (www.electrochem.org) and click on the "Awards" link. Awards are grouped in the following sub-categories: Society Awards, ECS Division Awards, Student Awards, and ECS Section Awards. Please see the individual award call for information about where nomination materials should be sent; or contact ECS headquarters.

The **Energy Technology Division Graduate Student Award** was established in 2012 to recognize and reward promising young engineers and scientists in fields pertaining to the Division. The awards are intended to encourage the recipients to initiate or continue careers in this field. Up to two recipients chosen will receive an appropriately worded certificate as well as an amount of $1,000, payable to the recipient. In addition, the recipient will receive a waiver of student registration, and un-reimbursed travel expenses to attend the Spring ECS meeting, an amount not to exceed $1,000 in order to accept the award. The next award will be presented at the ECS spring meeting in Chicago, Illinois, May 24-28, 2015.

Nominations and supporting documents should be sent to Energy Technology Student Award, c/o The Electrochemical Society, 65 S. Main Street, Building D, Pennington, NJ 08534; Phone: 1.609.737.1902; e-mail: awards@electrochem.org. Electronic submission of nomination packets is preferred. **Materials are due by September 1, 2014.**

The **H. H. Dow Memorial Student Award of the Industrial Electrochemistry and Electrochemical Engineering Division** was established in 1990 to recognize promising young engineers and scientists in the fields of electrochemical engineering and applied electrochemistry. The award consists of a scroll and a prize of $1,000 for educational purposes. The next award will be presented at the ECS spring meeting in Chicago, Illinois, May 24-28, 2015.

Nominations and supporting documents should be sent to IEEE Dow Student Award, c/o The Electrochemical Society, 65 S. Main Street, Building D, Pennington, NJ 08534; Phone: 1.609.737.1902; e-mail: awards@electrochem.org. Electronic submission of nomination packets is preferred. **Materials are due by September 15, 2014.**

The **Student Achievement Award of the Industrial Electrochemistry and Electrochemical Engineering Division** was established in 1989 to recognize promising young engineers and scientists in the field of electrochemical engineering and to encourage the recipients to initiate careers in this field. The award consists of a scroll and a prize of $1,000 for educational purposes. The award consists of a scroll and a prize of $1,000 for educational purposes. The next award will be presented at the ECS spring meeting in Chicago, Illinois, May 24-28, 2015.

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Student Travel Grants

Many of the Society's Divisions offer travel assistance to students and early career professionals presenting papers at ECS meetings. For details about travel grants for the 226th ECS meeting in Cancun, Mexico, please see the Cancun Call for Papers; or visit the ECS website: www.electrochem.org/student/travelgrants.htm. Please be sure to click on the link for the appropriate Division as each Division requires different materials for travel grant approval prior to completing the online application. You must submit your abstract and have your abstract confirmation number in order to apply for a travel grant. Apply for travel grants using the online submission system (links found on the travel grant web page). If you have any questions, please email travelgrant@electrochem.org. **The deadline for submission for fall 2014 travel grants is July 1, 2014.**

Awarded Student Memberships Available

ECS Divisions are offering Awarded Student Memberships to qualified full-time students. To be eligible, students must be in their final two years of an undergraduate program or enrolled in a graduate program in science, engineering, or education (with a science or engineering degree). Postdoctoral students are not eligible. Awarded memberships are renewable for up to four years; applicants must reapply each year. Memberships include article pack access to the ECS Digital Library, and a subscription to *Interface*. To apply for an Awarded Student Membership, use the application form on the next page or refer to the ECS website at: www.electrochem.org/membership/student.htm.