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Ceramic & Glass MANUFACTURING

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THE VALUE OF COLLABORATION: PARTNERSHIPS ARE A PATH TO SUCCESS

ABET ENSURES QUALITY IN UNIVERSITY ENGINEERING EDUCATION




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CONTENTS

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INDUSTRY NEWS

SCHOTT BEGINS PRODUCTION IN CHINA

Specialty glass manufacturer SCHOTT opened a new factory in Jinyun, China, to manufacture high-quality borosilicate glass tubing to produce vials and syringes for COVID-19 vaccines. With an initial capacity of 20,000 tons of glass and room for further expansion, the plant is functioning as a production and supply hub in the region.

The Schott plant, in the eastern coastal region of China.

Berlin Packaging plans to expand its operations in the Balkans and the Mediterranean.

BERLIN PACKAGING ACQUIRES GLASS SUPPLIER IN GREECE

Berlin Packaging announced the acquisition of Elias Valavanis S.A., a supplier of glass packaging for the food and beverage industry. Based in Larissa, Greece, Elias Valavanis has locations in Bulgaria, Romania, and throughout Greece. This acquisition is the fifteenth that Berlin Packaging completed in Europe since 2016, and its fifth in Europe this year. The company says all employees and locations for this acquisition will be retained.

VERDER SCIENTIFIC ACQUIRES MAGER SCIENTIFIC

Verder Scientific Inc. agreed to acquire all shares of Mager Scientific Inc. Verder Scientific, based in Newtown, Pa., is a division of the Netherlands-based Verder Group, a family-owned group of companies that develops, manufactures, and distributes industrial equipment. Mager Scientific, based in Dexter, Mich., is a distributor of metallographic and hardness testing equipment in the U.S. and represents the QATM product lines. Verder Scientific president Georg Schick will become president of Mager Scientific, while Jarrad Lawlor, former owner of Mager Scientific, will lead the QATM business unit for the U.S. and Canada, as well as oversee its Nikon operations.

Georg Schick and Jarrad Lawlor

RHI Magnesita employs 12,000 people in 28 production sites around the world.

RHI MAGNESITA TESTING CARBON DIOXIDE SEPARATION TECHNOLOGY

RHI Magnesita executed a memorandum of understanding with Australian technology company Calix Limited. The agreement covers the development of a flash calciner for use in the production of refractory materials to enable carbon dioxide separation. The companies agreed to undertake studies up to and including engineering and design for a commercial-scale demonstration facility at an RHI Magnesita site.

CERANOVA CORP. MOVES, EXPANDS

CeraNova Corp. moved to a new location in Marlborough, Mass. CeraNova manufactures transparent and advanced ceramics for a range of applications. The new location provides nearly 50% more space for manufacturing, research and development, and office support. "Our government contract work continues to expand, and our commercial sales for 2020 more than doubled from the previous year," says John Gannon, president and CEO.

FIRST SOLAR INVESTS IN THIRD PANEL PLANT IN OHIO

First Solar, Inc. says it will invest $680 million to expand its U.S. domestic photovoltaic (PV) solar manufacturing capacity by 3.3 gigawatts annually, constructing its third U.S. manufacturing facility in Lake Township, Ohio. The facility is expected to begin operating in the first half of 2023. Tempe, Ariz.-based First Solar produces ultralow carbon, thin film PV modules using a fully integrated, continuous process under one roof. In addition to its Ohio manufacturing facilities, First Solar also operates factories in Vietnam and Malaysia.

First Solar expects to produce an average of one PV module every 2.75 seconds across its three-factory Ohio footprint.

The sample chamber with sample holders.

CERAMTEC SAMPLE CONTAINERS HEADED TO SPACE

The CeramTec Group produced ceramic sample containers for a space experiment facility on the International Space Station. The silicon nitride sample holders are used in the electromagnetic levitator, a multipurpose research facility for experiments on board the ISS. The facility enables precision measurements of thermophysical properties of metals, alloys, and semiconductors that are not possible on earth, making it feasible to analyze the formation of material structures and to expand the understanding of transition processes, atomic structures, and material properties. The sample containers started their journey into space with the SpaceX-22 in June 2021.

ENCIRC COMMITS TO DECARBONIZATION

Glass manufacturer Encirc announced its commitment to decarbonizing by the middle of this decade, using hydrogen in its furnaces to create billions of ultralow-carbon glass bottles. The availability of hydrogen will enable the further expansion of Encirc's Elton facility in the United Kingdom. Encirc employs more than 1,000 people at its Elton facility. It will use the supply from the U.K.'s proposed HyNet North West regional decarbonization project in its furnaces. The HyNet North West program is bidding to be one of at least two chosen by the government to produce, store, and distribute hydrogen, as well as capture and store carbon from industry in the northwest of England and North Wales.

Encirc also completed a fuel-switching initiative this year at a plant in Northern Ireland.

THE VALUE OF COLLABORATION: PARTNERSHIPS ARE A PATH TO SUCCESS

By David Holthaus

Michael Jordan may be the greatest basketball player ever, but he knew he couldn't win on his own.

"Talent wins games, but teamwork and intelligence win championships," Jordan is quoted as saying. That was true of his Chicago Bulls. It wasn't until a visionary coach built a team around Jordan that the once-forlorn Bulls won six championship titles.

This advice is true in business too. Ground-breaking ideas need the fertile soil provided by partners in business, government, and academia so the concepts can germinate and grow.

A network of partnerships helped propel a small business called SpheroFill LLC to research and develop innovative medical applications for a cutting-edge technology. While serving as a senior scientist at Savannah River National Laboratory in South Carolina, George Wicks invented porous wall hollow glass microspheres, originally for strategic purposes.

Wicks was convinced there were other uses for the technology, and the laboratory put out a request for proposals for new uses. As Paul Weinberger tells it, he and a colleague, William Hill, both submitted proposals, both of them for regenerative medicine. Weinberger's was for regrowing tracheas, while Hill's was for regrowing bone.

The spheres, one-third the size of a human hair, about 20–40 microns, contain channels or pores through which liquids, gases, or solids could pass into the hollow void of the sphere. "That gave us the idea to use it as a carrier for molecules," Weinberger says.

Both of their ideas received funding, and as the two of them began collaborating with Wicks, a partnership gelled.

"By the second or third meeting, we came to the realization that we really got along well together, and regardless of what happened to our individual projects, we'd be friends, and we started to work on this together long-term," Weinberger says.

A three-dimensional sound field created by Materials Development Inc. enables levitation of 25 styrofoam spheres. The process allows for measurements using neutron methods to study how liquids change into glass and to investigate extreme temperature processes. *Credit: Materials Development Inc.*

The three brainstormed further possibilities for the technology, including the possibility of developing it as a soft-tissue surgical filler. After reviewing the literature, they determined that that such an application had not yet been developed. "We realized if we didn't do it, nobody would," Weinberger says.

In 2015, they formed SpheroFill and were awarded patents from several countries, including the United States, Japan, and the European Union. A partnership with the Applied Research Center (ARC) helped build the technology. ARC is a not-for-profit economic development agency located in Aiken County, S.C., at the county-owned Savannah

River Research Campus. SpheroFill set up shop there with seed funding, lab space, access to an electron microscope and analysis equipment, and expert consultants.

Other than the seed grant, the partners bootstrapped the new company using funds from their retirement savings, Weinberger says. Earlier this year, their work received a big boost when the National Science Foundation (NSF) awarded the team a $256,000 grant to continue their research.

"The NSF's stamp of approval is huge," Weinberger says. "They have a huge infrastructure for picking up companies and carrying them across the finish line and showing them what it takes to bridge the gap commercially."

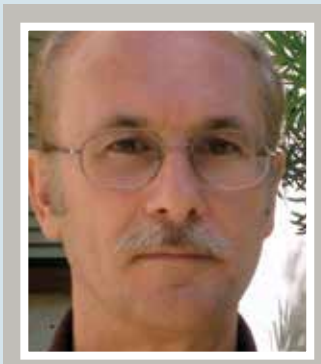
With an annual budget of $8.5 billion, the NSF is the funding source for about 25% of all federally supported basic research conducted by U.S. colleges and universities.

The Advanced Photon Source at Argonne National Laboratory in Lemont, Ill. *Credit: Argonne National Laboratory*

The grant process was difficult, Weinberger says. With an application that ran to more than 200 pages, the SpheroFill team had help from the South Carolina Research Authority, a public, not-for-profit corporation, as well as from a former university dean of research and development turned consultant.

"Those were things we had no experience with," Weinberger says. "We relied on our newfound partners and collaborators. It was a humbling but very strong learning experience."

The grant came from the NSF's Small Business Technology Transfer Program, designed to help small businesses transform ideas into marketable products. After completing the 12-month Phase I award, the company will be eligible for a second round of investment from NSF.



Rick Weber

The government funding is critical to a small company, such as SpheroFill, engaged in long-term research into leading-edge technology, Weinberger says.

"We could have languished and floundered and not gone anywhere," he says. "It takes so much to de-risk new biomedical technologies. It's so much expense, and no investor will touch a company that was at the stage we were at a year ago."

Small businesses such as SpheroFill work on problems that are big and complex. That's why they need help from government and other partners, says Rick Weber. Weber in 2006 founded Materials Development Inc., or MDI. MDI has developed an instrument to process and study materials in extreme conditions.

Weber had worked with a company developing advanced instruments for NASA flight experiments and realized that the noncontact processing tools he was helping to develop could be used for processing advanced glasses. Studying materials in extreme temperatures is confounded by the container. A perfectly inert container does not exist in nature, so experiments can be contaminated.

Weber's solution was to eliminate the container and use acoustic and aerodynamic forces to levitate materials so they float at temperatures as high as 3,500°C. The materials can then be probed with neutron or X-ray beams to investigate their structure and reactions to such extreme conditions. The process is useful for creating high-performance optical and laser glasses, defect-free crystals for the semiconductor industry, aerospace alloys, and, at lower temperatures, development of amorphous pharmaceuticals.

Weber and his small team collaborated with scientists at the Argonne National Laboratory (ANL) Advanced Photon Source, a high-power, radiation light-source research facility owned by the U.S. Department of Energy.

The work was partially funded by a Phase II Department of Energy Small Business Innovation Research award that was completed in 2015, and it resulted in MDI's development of a sample aerodynamic levitation system.

The government support benefits both parties, Weber says. "It's very good funding for this type of work," he explains. "It helps the agency get creative talent from the industry. And it helps us commercialize the technology."

MDI's work was continued at the Spallation Neutron Source at Oak Ridge National Laboratory (ORNL), which provides intense neutron beams for research.

These one-of-a-kind facilities have been integral to MDI's development of instruments to study materials in extreme environments, Weber says.

CACT photo: Alfred University's Center for Advanced Ceramic Technology provides short-term analytical programs, sponsored research, internships, and workforce development programs for New York State companies. *Credit: Alfred University*

"Small business can be very fast-moving and innovative," he says. "But government labs have resources that are unique and specialized, so there's a natural synergy there, in some cases."

The company's access to the high-tech infrastructure at ANL and ORNL was precipitated by networking at professional conferences. Weber recommends that small-business owners and researchers develop relationships with people at agencies that are relevant to their work.

"It's really important to understand what their goals are and to get to know some of the people involved in the program," he says. "Talk to them and learn about where you fit in."

Small businesses are not the only companies that benefit from partnerships and collaborations.

Corning Inc., an $11 billion global concern, holds the Corning Glass Summit every two years to foster collaboration with academicians studying and teaching materials science.

"It's an opportunity to establish closer relationships with professors at various universities in the U.S. and abroad," says Tim Gross, a research fellow at the Corning, N.Y.-based company.

The first Glass Summit took place in 2014 and addressed problems facing the glass science and technology community, identifying research areas of interest to Corning and the industry. In 2016, the Summit explored emerging glass applications, and in 2018, organizers added a poster session focusing on academic research. Post-doctoral researchers, undergraduates, and graduate students presented on glass and materials science topics, creating opportunities for Corning employees to interact with promising researchers early in their careers.

The pandemic canceled the 2020 event, and it was held virtually in 2021, which opened it up to a broader audience overseas.

The Summit helps connect Corning, which employs about 50,000 people worldwide, with students and professors interested in glass science. "The main motivation is to make sure we have a strong talent pipeline," Gross says. "We want to hire people who have a strong foundation in the things we care about."

Fifty universities, government agencies, and professional organizations were represented at the 2018 event.

Corning also sponsors a sabbatical program that offers professors the opportunity to work with Corning scientists on research topics. The Gordon S. Fulcher Sabbatical Program (named for a famed Corning glass scientist) selects one outside researcher per year to participate


Tim Gross

in the program at the company's Sullivan Park research lab. The sabbatical can last from six to 12 months.

New York is also home to a partnership among the state government, industry, and academia. The state funds 15 Centers for Advanced Technology to promote collaboration among private industry and universities. Alfred University's Center for Advanced Ceramic Technology (CACT) was one of the first, having been established in 1987.

"Our mission is to support the growth of industry in New York State," says David Gottfried, the CACT's deputy director of business development. "We offer applied research to help solve short-term or intermediate-term industrial challenges."

The research can range from conducting material analysis to working on multiyear projects to assist in bringing new technologies to the market. "We try to cover the whole spectrum from short-term analytical to long-term sponsored research," Gottfried says.

The Center typically works with 35 to 40 companies a year, on 100 to 120 projects.

The Center also assists with workforce development, sponsoring student internships, and covering half of the cost of their pay and overhead. It also partners with companies seeking to apply for federal Small Business Innovation Research grants.


David Gottfried

The results for business include savings in personnel and equipment costs, and new revenue from commercializing new products. The benefits for the state include the creation and retention of jobs, new capital investment, and additional tax revenue.

A state report found the economic impact of the overall CAT program from 2017 to 2019 to be $25.7 billion, providing an annual return on investment of up to 45 to 1.

That's something Michael Jordan would undoubtedly admire.

How to participate in DARPA's small-business technology and innovation programs

The Defense Advanced Research Projects Agency (DARPA) is an arm of the U.S. Department of Defense responsible for developing emerging technologies for the military. Its mission is "to make pivotal investments in breakthrough technologies for national security." This article was originally published on DARPA's website, https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program.

PROGRAM HISTORY

Congress established the Small Business Innovation Research (SBIR) Program in 1982 to provide opportunities for small businesses to participate in federal government-sponsored research and development.

The goals of the program are to stimulate technological innovation; use small business to meet federal R&D needs; foster and encourage participation by socially and economically disadvantaged small-business concerns (SBCs), and by SBCs that are at least 51% owned and controlled by women; and increase private-sector commercialization of innovations derived from federal R&D, thereby increasing competition, productivity, and economic growth.

Congress established the Small Business Technology Transfer (STTR) pilot program in 1992 to stimulate a partnership of ideas and technologies between innovative SBCs and research institutions through federally funded research or research and development. The STTR program is a vehicle for moving ideas from our nation's research institutions to the market, where they can benefit both private-sector and military customers.

THREE PHASES OF SBIR AND STTR

The SBIR and STTR programs are composed of the following three phases.

Phase I involves a Department of Defense (DoD) program announcement that seeks contract proposals to conduct feasibility-related experimental or theoretical research and development projects related to the agency's mission. These projects, as defined by agency topics contained in a program announcement, may be general or narrow in scope, depending on the needs of the agency. The object of this phase is to determine the scientific and technical merit and feasibility of the proposed effort and the quality of performance of the SBC with a relatively small agency investment before consideration of further support in Phase II.

Several different proposed solutions to a given problem may be funded. Proposals will be evaluated on a competitive basis using the criteria published in the DoD program announcement. Considerations may also include program balance with respect to market or technological risk, or critical agency requirements.

Phase II continues the research/research and development effort from the completed Phase I. The DoD does not issue separate SBIR or STTR program announcements for Phase II. All Phase I awardees for a given topic will receive notice of when to submit a Phase II proposal.

The agency must base its decision on the results of work performed under the Phase I award and the scientific and technical merit, and the commercial potential of the Phase II proposal. Phase II awards may not necessarily complete the total research and development that may be required to satisfy commercial or agency needs beyond the SBIR or STTR programs. The government is not obligated to fund any specific Phase II proposal.

Phase III refers to work that derives from, extends, or completes an effort made under prior SBIR or STTR funding agreements, but it is funded by sources other than the SBIR or STTR programs. Phase III work is typically oriented toward commercialization of SBIR- or STTR-funded research or technology.

HOW TO PARTICIPATE

DARPA issues SBIR and STTR funding opportunities on a "just-in-time" basis, outside of the three predetermined announcements issued at the DoD level.

Step 1: Determine eligibility. Review complete eligibility requirements at https://www.sbir.gov/about#sbir-policy-directive – Chapter 6: Eligibility and Application (Proposal) Requirements.

For SBA's Guide to SBIR/STTR program eligibility, please search for SBIR Eligibility at https://www.sbir.gov/ (You must use the search function on the top right-hand side of the page.)

Step 2: Find a topic. Review the current and past announcements at https://www.dodsbirsttr.mil/submissions/login to identify topics of interest. On the announcement page, you will find the announcement instructions and topics for each DoD component. Click on the DARPA tab to find the topics and instructions. Be sure to review both the DoD Announcement Instructions and the DARPA-specific Instructions.

Step 3: Ask questions. During the announcement period, communication between small businesses concerns and topic authors is highly encouraged. During the prerelease period, you may have direct communication with a topic author to ask technical questions about their topic. For your convenience, contact information is provided within each topic.

To ensure competitive fairness, direct communication between proposers and topic authors is not allowed once a topic enters the open period (when SBCs are able to submit proposals to DoD). However, during the open period, proposers may submit written questions about open topics via the DARPA SBIR/STTR BAA email address listed in the topic instructions. All questions and answers generated from emails are posted in Q&A documents and published under the topic listing

at https://www.darpa.mil/work-with-us/opportunities and at https://www.darpa.mil/work-with-us/for-small-businesses/proposers-day.

All proposers are advised to monitor these pages during the open announcement period for questions and answers and other significant information relevant to their SBIR/STTR topics of interest.

A soil scrubber to clean chemical warfare agents, left, was developed for DARPA by the Southwest Research Institute, San Antonio, Texas. *Credit: DARPA*

Step 4: Prepare your proposal. All proposals are initially screened to determine responsiveness with submission requirements published in the DoD SBIR/STTR Program Announcement and supplemental DARPA instructions. Proposals that do not comply with the requirements are considered nonresponsive and are not evaluated. Proposals that do comply with the requirements are evaluated by engineers and/or scientists to determine the most promising technical and scientific approaches.

Step 5: Submit proposal. All SBIR/STTR proposals must be prepared and submitted electronically through the DoD SBIR/STTR Electronic Submission website at https://www.dodsbirsttr.mil/submissions and in accordance with the program announcement. Once you begin a proposal cover sheet, you may edit the cover sheet and proposal volumes at any time until the BAA close (or due date for the Phase II proposal). When you have completed your proposal and reviewed it, you must click "Submit Proposal." If the proposal status is "In Progress," it will not be considered submitted upon the announcement close.

TYPES OF FUNDING AGREEMENTS

DARPA administers all SBIR and STTR projects as firm-fixed price, cost plus fixed-fee contracts, and on a case-by-case basis, other transactions (OTs) for prototype.

OTs are instruments other than contracts, grants, and cooperative agreements that are used to stimulate, support, or acquire research or prototype projects.

Intellectual property (IP)

See https://www.acquisition.gov/browse/index/far, reference clause 52.227-11.

And https://www.acq.osd.mil/dpap/dars/dfarspgi/current/, reference clauses: 252.227-7013, 252.227-7014, 252.227-7015, 252.227-7038.

For OTs, the parties are allowed flexibility to negotiate IP because Bayh-Dole does not apply. DARPA normally does not acquire IP rights that will impede commercialization of technology.

EXPORT CONTROL

The following will apply to all projects with military or dual-use applications that develop beyond fundamental research (basic and applied research ordinarily published and shared broadly within the scientific community):

–The contractor shall comply with all US export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.

–The contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed onsite at any government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technologies, including technical data or software.

¬–The contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

–The contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

Please visit http://www.pmddtc.state.gov/regulations_laws/itar.html for more detailed information regarding ITAR/EAR requirements.

ABET ENSURES QUALITY IN UNIVERSITY ENGINEERING EDUCATION

By Eileen De Guire

Suppose you are an employer seeking a materials scientist for an entry-level position. You advertise the position, and soon you have a short list of qualified candidates from reputable schools to interview.

As an employer, you have made some assumptions about "qualified candidates" and "reputable schools." How do you know a candidate's education makes them qualified, and what makes an educational institution reputable?

A working session from the 2016 ABET annual meeting. Janet Callahan (third from left) was ACerS's ABET commissioner at the time. *Credit: Janet Callahan*

Education quality in the United States is assessed through accreditation processes, and there are several accrediting organizations that serve specific segments of the higher education system. ABET, previously known as the Accreditation Board for Engineering and Technology, accredits "college and university programs in the disciplines of applied and natural science, computing, engineering and engineering technology at the associate, bachelor's and master's degree levels," according to its website (www.abet.org). Through a rigorous process of self-assessment and external review, ABET accreditation ensures college and university programs meet set standards for quality. "With ABET accreditation, students, employers and the society we serve can be confident that a program meets the quality standards that produce graduates prepared to enter a global workforce," according to the website.

ABET depends on professional societies and their volunteers. Societies provide input, but in addition, all decisions are made by representatives from member societies. The criteria are developed and approved by ABET's Commissions and the Area Delegations, comprising volunteers from the member societies.

ACerS has a long tradition of participating in ABET. In an interview with *Bulletin* editor Eileen De Guire, Darryl Butt, FACerS and dean of the College of Mines and Earth Sciences at the University of Utah, talks about his work as an ABET volunteer.

Q: ***What is your involvement in ABET?***

A: I'm not an employee or representative of ABET, but I volunteer as an ABET program evaluator. I volunteer through ACerS to help ABET review ceramic engineering programs. I've also been a beneficiary of ABET in that I've hired many students over the years from ABET-accredited engineering programs, not just ceramic engineering students but also materials science, mechanical engineering, electrical engineering students, and more.

Q: ***Why does ABET-accreditation matter not only to programs and students, but also to the employers who hire degreed students?***

A: First of all, it really helps engineering degree programs by setting up a framework for continuous improvement. There's a bunch of different parts to the ABET accreditation review related to faculty, facilities, student outcomes, and more; and there are certain things that ABET expects of universities in terms of curriculum. Math and science, obviously, engineering courses, and more. But the process also sets up a framework for how you decide what you're training students to be able to do and who you should be consulting with related to the program's constituencies. Engineering programs engage

with a variety of constituencies, which may include industry, employers, and their alumni. A program's constituencies are unique to where you are in most cases, and so it looks at things from many different angles, internally as well as externally. It basically sets up this framework or helps you set up a framework for continuous improvement in your program and staying relevant.

ABET accredited programs provide students with the all the right tools so that when they go out into industry or to a national lab or to graduate school, they're going to have the skills that they need to be successful. For example, for professional licensure, students must have earned a degree from an ABET-accredited program.

I am a big fan of continuous improvement and what ABET embodies. I have to tell you, what I've learned over the years is if you make continuous improvement part of your corporate or university culture, and you use it in the spirit that it's intended, it really facilitates conversations between the faculty, between the students, and the constituencies in a way that can be fun. It also is a way to set up a process for facilitating discussions about teaching pedagogy. It keeps you at the forefront of education.

Q: ***How often does an engineering program go through the accreditation process?***

A: The typical process is every six years. I should point out that ABET accredits not just U.S. engineering degree programs but also international ones.

Q: ***How would you say ABET is relevant in our industry, especially in light of the diminished number of ceramic engineering programs?***

A: I think this is a really important question. There are three ABET-accredited ceramic engineering programs left in the U.S. And obviously, there are other ones internationally that we, in effect, support. But ceramics is deeply embedded in most materials science and engineering programs. So, if you're an ABET evaluator for ceramic engineering, based on ACerS requirements, you've also completed training as an evaluator for materials science programs. Our evaluators are embedded across the country, contributing to engineering excellence. And the ceramics industry doesn't only hire ceramic engineering students. They hire mechanical engineers, electrical engineers. ABET supports the ceramic industry by accrediting engineers from all different disciplines that support our industries as well as national labs. We don't

want to look at our Society as being just these three programs. Our Society is interdisciplinary. It's much broader than that.

Another thing—accreditation of engineering programs isn't just about looking at science and math. It's also to some degree about assuring that engineering students get a broad education, which means that they learn the higher order skills of leadership and appreciating diversity and inclusion. In the future, I suspect there's going to be some requirements for cyber security. There are all sorts of things that we should be paying attention so that students coming out of accredited universities have lots of skills.

Q: ***Just to clarify, you are connected with the team that evaluates materials science and engineering?***

A: Yes. So when you petition to join as an ACerS evaluator, we decided a while ago, and partly because there are so few ceramics programs that we also accredit, to collaborate with TMS. So ACerS-approved evaluators are also approved by TMS to evaluate ceramics programs. Approved ACerS program evaluators thus potentially contribute to the materials engineering programs as well as ceramic engineering programs.

Q: ***It sounds like the professional societies are critical to the ABET accreditation process?***

A: Absolutely. Their participation is vital.

Q: ***Would it be fair to say that the societies are representing the needs of their industries through the volunteers that they support to ABET?***

A: Through their members, volunteers provide feedback to programs on how they can improve their programs. We have folks in The American Ceramic Society who are involved in ABET at a whole bunch of different levels, from people like me (evaluators) to people who are commissioners. When ABET makes a change in their expectations, the professional societies have a voice in that. And because they do stay in touch with their constituencies, then ABET gets feedback from constituencies in effect through the volunteers of the societies.

Q: ***Why would you say ABET is important to the societies that support it?***

A: It's an outside organization that keeps us honest and assures quality. The last thing we would want in our industry is for us to have catastrophic problems in the field of ceramics. Ceramics are used for all sorts of things that life depends on, right? Human implants and as lining of gigantic furnaces and critical parts and in aerospace systems. If we didn't have this outside entity assuring that our graduates have certain standards in terms of ethics, certain skills in terms of math and physics and in engineering talents, we can have serious problems in the industry. Having this sort of independent body helps assure our quality and keeps us honest, which helps the whole industry to be more competent and credible. That's great.

Q: ***Do you have to be an academic to be an evaluator?***

A: A lot of folks from all sorts of different fields or areas help with ABET. People from industry are very important, people from national labs get involved. It's really quite a mix. And you know, it's interesting, the visits. The evaluators are typically not academics. There are always some academics in the mix, but oftentimes it's folks from industry. We really appreciate the industrial members.

Q: ***If somebody wants to get involved with ABET, how would they do that?***

A: If you go to www.abet.org, there's a wealth of information there. In fact, there's a button you can click on that says "About ABET," and you can learn a ton. And in fact, I think there's some information there on why ABET is valuable.

Also, on the ACerS webpage, you can click on the "About" link and click on "Committee Roster" under "Governance," and you'll find a list of the people in ACerS that are ABET representatives, and it's a wonderful group of folks. Any one of them will be more than happy to talk your head off about ABET because they're all big advocates and are very enthused about it.

Q: ***Is there anything else that is important for our audience to be aware of?***

A: I think the one message that I would like to have resonated is that if, as a university, you embrace the principles of continuous improvement, over time what you discover is that it gets easier and easier and becomes part of your culture. Eventually, what happens is continuous improvement actually becomes kind of fun. And it really is just a way to facilitate conversations between your students, your faculty, your constituents. There's work that goes along with it—writing, documentation, etc. You should be doing that anyway, and once you get used to thinking in a sustainable way about how to improve your organization, the accreditation process becomes unintimidating and really can be kind of fun and what we should be doing anyway.

And I do think we need the support of the Society. We need everyone to understand why we need to support ABET accreditation of our programs. And everyone in the Society should understand what ABET is because it does impact everybody. We need more involvement, too. No question.

ADVERTISERS INDEX

SEPTEMBER 2021 • VOLUME 2 • ISSUE 3

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VOLUME 2

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Issue	Theme
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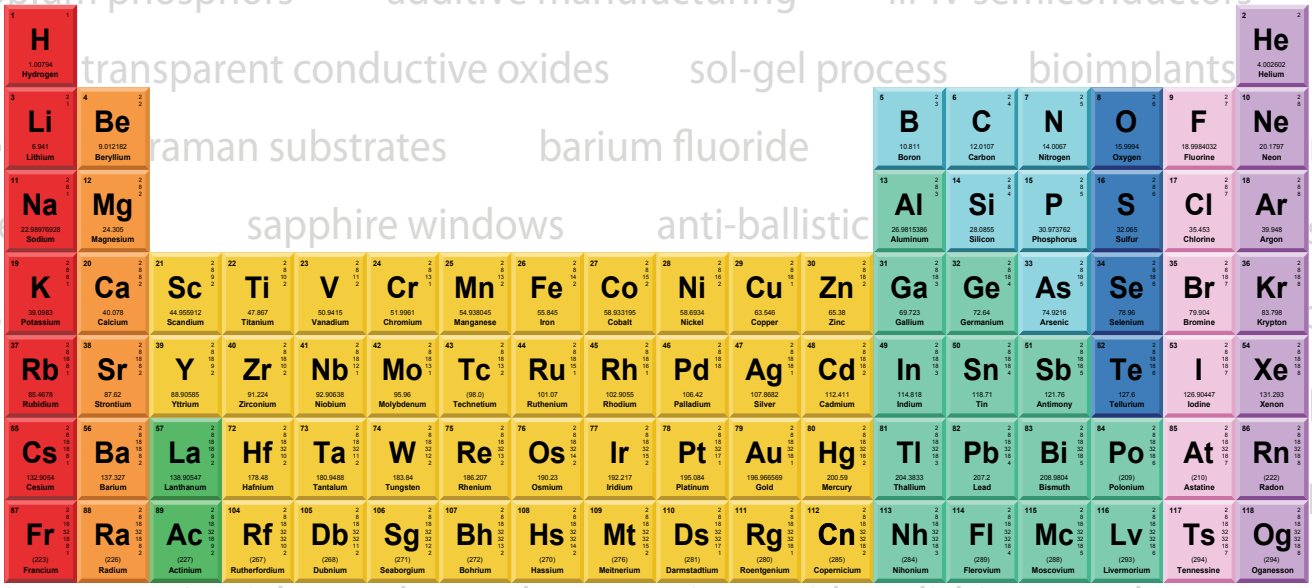

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