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MESSAGE FROM THE HEAD

Engineering growth for future success in CEMS

C. Daniel Frisbie
Distinguished McKnight University Professor and Department Head

Let me begin by thanking you for taking the time to read this newsletter! Enclosed you will find updates on a wide range of CEMS activities from the 2016–17 academic year which ended on June 30th.

One of the most important accomplishments for CEMS in the 2016–17 academic year was the establishment of our first ever External Advisory Board (EAB). The inaugural EAB consists of 12 members, mostly from industry, who are advising the department on a spectrum of strategic issues central to the vitality of our teaching, research, and service missions. Topics before the Board include, for example, strategies for maintaining our strength as a top engineering program, enhancing our interaction with industry, garnering broader support from our alumni, increasing the diversity of our students and faculty, attracting investment, commercializing our discoveries, and amplifying our overall impact in engineering education. As many Board members are industrial leaders, they can provide valuable perspectives on hiring trends in industry, workforce development needs, and long-range, mega-trends in technology that may impact the plans we make for faculty hiring, student recruiting, and the choice of research topics. Inside this newsletter you will read profiles of many of our current EAB members. They are an outstanding group of professionals, and we are very grateful for their efforts on behalf of CEMS! The first two meetings on October 7, 2016 and May 5, 2017 were great successes.

This spring, the department also concentrated heavily on faculty hiring. I am pleased to report that three new faculty will join our ranks. Dr. Nathan Mara (Ph.D. MSE), currently a staff scientist at Los Alamos National Laboratory, is a well-known metallurgist and will join the department at the end of 2017 as Associate Professor. Mara’s arrival is timely as our current metallurgist and mechanical properties specialist, Professor Bill Gerberich, has just retired (see page 8). Dr. David Poerschke (Ph.D. MSE), a high temperature ceramicist out of the University of California Santa Barbara, will join as Assistant Professor at the end of the summer in time for the start of the fall semester. And Dr. Michelle
Calabrese (Ph.D. ChE), a rheologist, will also join us as Assistant Professor after she completes a postdoctoral fellowship at MIT. You can learn more about these new faculty in future issues of CEMS News. Overall, we had an outstanding recruiting season.

At our CEMS graduation in May, 126 students received B.ChE and 58 students received B.MatSci degrees. It was a strong cohort of students! Our incoming graduate student class also looks strong: a total of 44 Ph.D. students will join us in September, 30 in ChE and 14 in MSE.

We are pleased to report that three CEMS faculty members earned promotion this spring. Russ Holmes was promoted to full Professor and Ben Hackel and Bharat Jalan were promoted to Associate Professor with tenure. The department is certainly proud of their accomplishments.

Finally, we were grateful to have Professor Lynn Walker of Carnegie Mellon University in the department from January to June as our 2017 Visiting Piercy Professor. Professor Walker catalyzed a number of discussions among our faculty and many of us benefited from her perspective on both soft matter rheology. It was a pleasure to have her with us for six months.

As always, I thank you for your support of the department. If you have not already done so, please consider joining the CEMS LinkedIn group (CEMS-UMN) where we can easily update you on department happenings and hear from you directly.
**Strong leadership guides department**

The CEMS External Advisory Board seeks to define a new era of success.

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**Leading change**

The CEMS External Advisory Board (EAB) is comprised of prominent leaders in science and business who are committed to introducing new ideas and pathways towards success. CEMS is pleased to introduce EAB members:

**Navjot Singh**

Navjot Singh (Ph.D. ChE ’94) serves as Chairman of the External Advisory Board. He earned an M.B.A. from Rensselaer Polytechnic Institute. Professionally, Singh is Managing Partner for McKinsey & Company, Boston, and is a leader in McKinsey’s Pharmaceuticals and Medicals practice and Public Sector Practice. He is also the co-founder of the Center of Asset Optimization where McKinsey does asset-level work with innovative, specialty and generics companies all around the world. He has over 15 years of experience at McKinsey and over six years at GE. He has broad experience serving pharmaceutical companies across the value chain.

**Cynthia Arnold**

Cynthia Arnold has over 30 years experience working in materials industries, most recently as Valspar’s Chief Technology Officer and Senior Vice President. In this role, she has lead Valspar’s global technology organization for coatings and paints, consisting of 1100 staff in 30 laboratories world-wide, and the integration of global R&D following Valspar’s acquisition by Sherwin Williams. Prior to holding this role, she was the CTO of Sun Chemical, a global pigments and inks supplier; the VP of Technology for Coatings, Adhesives and Specialties...
business of Eastman Chemical; and has held global technology leadership roles at General Electric Plastics and at GE’s Corporate R&D Center. She also served as a Sloan Executive Fellow in the Office of Science and Technology Policy at the White House in Washington D.C. She is a member of the American Coatings Association’s Science & Technology Committee and a Board member of the Minnesota Zoo. Arnold has a bachelor’s degree in chemical engineering and a MBA from the University of California at Berkeley, and a doctorate in materials science and engineering from Virginia Polytechnic Institute and State University.

David Bahr

David Bahr (Ph.D. MSE ’97) is a Professor and Head of Materials Engineering at Purdue University. Bahr received his B.S. and M.S. degrees in materials science and engineering from Purdue University. He worked for a short time at Sandia National Laboratories while earning his Ph.D. before starting as a faculty member in the School of Mechanical and Materials Engineering at Washington State University (WSU) in 1997. Prior to joining Purdue in August 2012 as Head of the School of Materials Engineering, Bahr was most recently the Director of the School of Mechanical and Materials Engineering at WSU, and before that served as WSU’s campus-wide Director of Undergraduate Research.

His research spans a range of materials reliability issues, from hydrogen embrittlement to high strain MEMS to dislocation nucleation in metals. In 2000 he won the Presidential Early Career Award for Scientists and Engineers for his work with Sandia on DOE stockpile stewardship. He is a Fellow of ASM International and the American Association for the Advancement of Science (AAAS).

Holly Boehne

Holly Boehne (ChE ’84) is Senior Vice President and Chief Technology Officer for the Andersen Corporation. She joined Andersen in 2004 and is responsible for leading Research, Development & Innovation, Supply Chain Services, and Lean Sigma for the Andersen enterprise. Previously, Holly held a variety of leadership positions in Research & Development, Lean Sigma, Strategic Manufacturing and Engineering at both Ecolab and Pillsbury. Her experience spans innovation, new product development and commercialization as well as manufacturing. She currently serves as a Board member for the Minnesota Children’s Museum and Science Museum of Minnesota.

Kimberly Chaffin

Kim Chaffin (Ph.D. ChE ’99) is a Distinguished Scientist and Bakken Fellow in Strategic and Scientific Operations at Medtronic, PLC. Chaffin earned her bachelor’s and master’s degrees in chemical engineering from the University of Michigan. She is a licensed Professional Engineer. Prior to joining Medtronic in 1999, Chaffin worked in the automotive industry (Ford Motor Company) on the design and use of adhesives in both product development and manufacturing roles.

In her current assignment, Chaffin is leading the effort to anticipate future technology needs of the enterprise and is working to identify new research areas and opportunities for external collaborations to support future products. Chaffin is an expert in polymer characterization, especially as it relates to structure-property relationships. She partners with all of Medtronic’s businesses as an internal consultant/researcher and maintains active research collaborations with her academic colleagues. She is a leader in the evaluation of polymeric materials, adhesives and cure, diffusion, polymer processing, and accelerated predictive testing. She is frequently consulted for her technical problem solving expertise and participates on numerous technical review boards.

Bruce Christensen

Bruce Christensen (ChE and MSE ’89) is Vice President, Global Technology and Innovation Management, for the Construction Chemicals Division of BASF SE, a position he has held since September 2010. He is responsible for oversight and coordination of all aspects of the innovation process of this division globally. Christensen received a Ph.D. in materials science and engineering from Northwestern University in 1993, with a special focus in Portland cement hydration. He is the 2007 recipient of the Sanford E. Thompson Award from ASTM International for a research paper of outstanding merit in the area of concrete and concrete aggregates.

continued on page 6
Mark Gehlsen
Mark Gehlsen (Ph.D. ChE ’93) earned his doctorate focusing on the synthesis and characterization of model polyolefin block copolymers. Gehlsen joined 3M in 1994 and currently serves as Global Technical Director for 3M’s Separation & Purification Sciences Division (SPSD). He has completed assignments in various R&D functions including Corporate Research, LCD Display materials, Pressure Sensitive Adhesives (PSAs) foam materials, and most recently leading the SPSD global laboratory organization.

Ronald Larson
Professor Ronald Larson (ChE ’75, M.S. ’77, Ph.D. ’80) became a Professor of Chemical Engineering at the University of Michigan in 1996, after working for 17 years at Bell Laboratories in Murray Hill, New Jersey. Larson’s research interests include the structure and mechanical properties of viscous or elastic fluids, which include polymers, glasses, colloids, and biological materials. He is also interested in flow and yielding and transport modeling.

In 1996, he was named the Prudential Distinguished Visiting Fellow at the Isaac Newton Institute in Cambridge England; in 2000 he was awarded the Alpha Chi Sigma Award from the AIChE; and in 2002 he received the Bingham Medal from the Society of Rheology. He holds a bachelor’s degree in chemical engineering from the Birla Institute of Technology and Science (India), a master’s degree in chemical engineering from the University of South Carolina, and a Ph.D. in chemical engineering from the University of Wisconsin-Madison.

Mukund Parthasarathy
Mukund Parthasarathy serves as Global TS&D Director for Dow Performance Silicons at Dow Chemical Company. Parthasarathy joined Dow Corning in 2009 as S&T Director for the Innovation Accelerator. He became the S&T Director for the Solar and Wind Business in 2011 before being named to lead the Business & Technology Incubator in 2012. He was named Director of Global Research in Dec 2013. Prior to joining Dow Corning he worked for General Electric in the Plastics and Superabrasives business in various technical leadership roles.

He holds a bachelor’s degree in chemical engineering from the Birla Institute of Technology and Science (India), a master’s degree in chemical engineering from the University of South Carolina, and a Ph.D. in chemical engineering from the University of Wisconsin-Madison.

Other members
Jason Li (Ph.D. ChE ’96), President of Tenergy Corporation, and Lee R. Raymond (Ph.D. ChE ’63), former CEO of ExxonMobil, complete the board roster. Robert W. Gore (Ph.D. ChE ’63) of W.L. Gore & Associates, Inc. serves as an honorary member.

With such a distinguished group of alumni and business professionals serving the department in advisory roles, CEMS is better positioned to effectively navigate challenges and seize opportunities for future growth and success.
Eray Aydil

Eray Aydil, Professor and Ronald L. and Janet A. Christenson Chair in Renewable Energy, is the recipient of a 2016-17 Outstanding Contributions to Graduate and Professional Education Award. As an award winner, Aydil received a one-time $15,000 award and became a member of the University’s Academy of Distinguished Teachers, which serves the University through various activities that aim to improve teaching and learning. Aydil was honored at an awards ceremony on April 27, 2017.

The Outstanding Contributions to Graduate and Professional Education Award recognizes faculty who are excellent teachers, who engage students in a community of intellectual inquiry, who are significant mentors and role models for students, and who develop and promote activities that help students understand the larger context of their intended professions.

Frank Bates

Regents Professor Frank S. Bates was elected to the prestigious National Academy of Sciences (NAS) for excellence in original scientific research. Membership in the NAS is one of the highest honors given to a scientist or engineer in the United States, and Bates is among 84 researchers nationwide to be elected to the National Academy of Sciences this year.

Bates is a world-renowned polymer scientist who focuses his research on block co-polymers. His group’s research program affects a variety of technologically important fields, including polymer processing, composites, fracture mechanics, separations, catalysis, and drug delivery. Bates has been an author or co-author of nearly 400 papers on research ranging from plastics and rubber made from renewable sources to coatings for more effective oral medicines. He has received numerous past awards and becomes one of the few scientists who are members of the National Academy of Sciences, National Academy of Engineering, and the American Academy of Arts and Sciences. For the complete news release, please visit: http://z.umn.edu/nas17.

Prodromos Daoutidis

Professor Prodromos Daoutidis has been appointed as a College of Science and Engineering (CSE) Distinguished Professor. These professorships were established to recognize distinguished faculty members within the College who have been judged to be exceptional through unusual efforts in, and contributions to teaching; an international reputation in scholarly research and genuine commitment to the College of Science and Engineering and its activities. Daoutidis received a financial stipend to be used for professional development or research and was formally recognized at the CSE undergraduate commencement celebration on May 12, 2017.

Daoutidis also recently won the Computing in Chemical Engineering Award as part of the 2017 AIChE Computing and Systems Technology (CAST) Division Awards. The award, sponsored by The Dow Chemical Company, seeks to recognize outstanding contributions in the application of computing and systems technology to chemical engineering. As an award winner, Daoutidis will receive a plaque and financial award and deliver an address at the CAST Division dinner at the AIChE Annual Meeting occurring in Minneapolis in October 2017. Other 2017 CAST Division Award winners include CEMS alumni Srinivas Rangarajan (Ph.D. ChE ’13) for the W. David Smith, Jr. Graduation Publication Award and Michael Baldea (Ph.D. ChE ’06) for the CAST Outstanding Young Researcher Award.
Faculty triumphs and appreciations

Longtime CEMS faculty members Ed Cussler and Bill Gerberich retired from their positions.

Longtime CEMS faculty member Ed Cussler retired in 2013, but continued teaching in the department through fall 2016. Professor Bill Gerberich retired from his faculty position in May 2016 after 46 years of service. Many generations of CEMS students hold these two faculty members in high esteem and recall some of their fondest experiences.

Cussler memories

1982

Tom Chresand (ChE '82).

I took two courses from Ed Cussler back in the early 1980s, and between my first job and graduate school, worked a short stint at Geltec, Ed’s startup company. Blue-sky brainstorming every day with a creative guy like Ed hardly felt like work, and I learned a lot in that short time. From time to time we would end up on the same afternoon bus, I on the way to South Minneapolis near Lake Harriet, and he to Edina. One day Ed turns to me and asks, “Do you think you could swim through molasses as fast as you could through water?” My first thought was “he must have run way too far at lunchtime and his mind is still reeling.” But thinking about the question a bit more, I realized that he was serious and that there were fluid dynamical principles that could be appealed to for either the yay or nay position. Not knowing as much about fluid dynamics as I should have, I took the easy way out and said, “Don’t know, why don’t you give it a try?” But his mischievous smile told me he had already thought about that.

It did not surprise me, many years later, to read that Ed had won an Ig Noble award for his published research: “Will Humans Swim Faster or Slower in Syrup?” As I said, I learned a lot from Ed, one thing being to never give up on, um, novel ideas. I am grateful to have been taught by, and to have worked with, Ed. His talent for teaching has been recognized and awarded, but perhaps it was never noted how important it was that he made this stuff fun. This was a gift that I and hundreds of students took into our work lives. I wish him a happy, well-deserved retirement.

1988

Kate [Kathleen] Shields (ChE ’88).

I was a much older student and worked close to full-time and got my degree (mostly) one class at a time, so I was usually on campus just for classes. I was also basically on my own for homework. So I welcomed Dr. Cussler’s efforts to create the student lounge, etc. I remember the way he interacted with students in the classroom. One day in CHEN Principles IV, he grabbed a bunch of pencils. As he lectured he threw them, one by one, into the hands of a flustered undergraduate. I’ve forgotten what point he was illustrating, but you definitely did not sleep in his classes--especially if you sat in front!

1993

Jim Yang (Ph.D. ChE ’93).

While we all know Ed as a world-class researcher and lecturer [poor Muggins!], my thoughts veer to two non-scientific items: [1] how he attracted a rather eclectic group of graduate students in the late 80s/early 90s [where I learned about South American politics and the merits of ZZ Top and Talking Heads] and [2] how good a
runner he was. Here was a world-famous scientist running six to 10 miles in the dead of winter with students 25 years his junior (like Josh Sweeney, Don McKenna, Mike Kent, and me), holding his own at a sub seven-minute/mile pace, and at the same time trying to convince me to read The Jordan Rules [which, of course, I had no time to do]. All the best, Ed!

2017

Ethan Loosbrock (ChE ’17).

One of my fondest memories is of Professor Cussler demonstrating how to properly bake a turkey just before Thanksgiving. He used Professor Dorfman as an example!

2018

Haley Beech (ChE ’18).

I feel extremely lucky to have been in the last class Professor Cussler taught. He walked into recitation on the first day dressed in a retro track suit, and sincerely apologized to us for his appearance. He explained that he was caught in a downpour while driving to work in his convertible, and had to change out of his suit since he was soaked through to the skin. He was feisty, forced students to engage in class by asking rapid fire questions, and told ridiculous stories about old scientists. But the thing I admired the most about Cussler was how deeply he cared; he cared about his students, and he cared about trying to improve the state of the world. He, more than any other professor, made me think about what I was learning and how it could be applied to the many huge problems us students will begin to help solve upon graduation. Thank you, Professor Cussler!

Gerberich reflections

1986

Jatin Sheth (M.S. MSE ’86).

Being part of Professor Gerberich’s group was a privilege and a fantastic learning experience. [I still can’t bring myself around to calling him Bill!] I distinctly remember his answer to my last question…I had just finished my M.S. requirements in November 1986 and was packing up to go back home to Bombay. I asked him, “Professor Gerberich, what do you think will be some of the practical applications of the research done in my thesis?” He replied, “Maybe in 30 or 40 years, they’ll think of something.” That was an eye-opener for me to the true spirit of research! And of course, I still have the calligraphy pen that I bought to try and write like he did. I dug through my archives and found the perfect photograph to send across as a memory (below).

Gerberich research group at the ASM conference in New Orleans in 1985. Pictured (from left to right): Tova Livne, Tim Foecke, Dr. Chong Soo Lee, Jatin Sheth, Prof. Gerberich, Wei-ji Lin, Shouhui Chen, Robert Keller, Michelle Vig, and Xing-fu Chen.

Robert Keller (MSE ’86, Ph.D. ’91).

I recall attending MatS 3400, my first materials science class, taught by Professor Gerberich in Spring Quarter 1983. I was a 20-year old Minnesota kid only shortly removed from high school, and that class was a world about which I knew nothing. It was exciting for me to finally escape the dullness of the plain old classes of calculus, general physics, and general chemistry. I really enjoyed it, but was given a dose of reality at the end, as I barely got a low B in my first class within my major. At that time, I had NO IDEA that the materials science roots Bill taught me in that class would end up forming the foundation for the rest of my undergraduate experience, let alone my professional career. Fortunately, I did manage to bring my grades up some in the department! I was incredibly honored when he asked me about attending graduate school in his group. And I feel I could not have done it without him as my advisor; I very likely would not have even tried.

Because of Bill’s faith in me, I gained confidence, learned an incredible amount, met marvelous people, made lifelong friends, worked with amazingly cool instruments, continued on page 23
Faculty promotions

*Ben Hackel, Russ Holmes, and Bharat Jalan achieve career milestones.*

**Benjamin Hackel**

Ben Hackel was promoted to the rank of Associate Professor with tenure. The Hackel lab engineers proteins for molecular targeting of medical therapies and diagnostics. Molecular diagnostics, including imaging, enable personalized medicine to differentiate responders from non-responders. Molecular therapies enable precision medicine for improved potency and reduced detriment relative to less targeted approaches.

Hackel and his students develop evolutionary technologies to engineer synthetic proteins with a unique combination of efficient physiological transport and selective target binding. The group studies how protein variations impact function inter- and intra-molecularly as well as physiologically, which advances protein biochemistry and aids utility. These engineered proteins are applied to detection, diagnosis, and therapy in oncology and neuroscience as well as antimicrobial strategies in infectious disease. The interdisciplinary lab has a diversity of educational backgrounds and collaborates with chemists, biologists, clinicians, as well as chemical and biomedical engineers. The lab is supported by the National Institutes of Health, the American Cancer Society, and commercial partners.

**Russell Holmes**

Russ Holmes’ academic career at the University of Minnesota began in 2006. His recent promotion to the rank of Professor is well-deserved, since he is widely recognized as a distinguished scholar, an outstanding teacher, and a dedicated citizen of CEMS. For the past four years, Holmes has served as Director of Graduate Studies for the Materials Science and Engineering program. In 2016, Holmes received the Morse/UMN Alumni Association Award for Undergraduate Teaching and was named a Distinguished University Teaching Professor.

The Holmes research group is working to realize novel optoelectronic devices based on organic and hybrid organic-inorganic thin film materials. These efforts are supported by thorough materials characterization activities seeking to better understand how molecular materials are deposited into thin films, and how charge and energy are transported in these systems.

Ongoing research is focused on the application of these materials in light-emitting devices (LEDs) for displays and solid-state lighting, and photovoltaic cells, for use in lightweight solar cells and light detectors. Commercially, organic semiconductor thin films are of interest for their compatibility with room-temperature, high-throughput processing on flexible substrates, and their exceptional optical properties. These materials have already found wide application in mobile displays, with growing interest for use in solid-state lighting and solar energy conversion. Holmes’ group consists of undergraduate and graduate student researchers with a range of academic backgrounds reflecting the interdisciplinary nature of the research.

**Bharat Jalan**

The ability to synthesize new materials and artificial structures – that are thermodynamically unstable in their bulk state - with unique functionalities has provided the foundation for modern electronics and much new discovery. As a newly tenured Associate Professor, Bharat Jalan will continue to research the development of novel synthesis approaches using the molecular beam epitaxy (MBE) method for high structural and electronic
Professor Russell Holmes (left) is working to realize novel optoelectronic devices based on organic and hybrid organic-inorganic thin film materials. Associate Professor Bharat Jalan (right) researches the development of novel synthesis approaches using a molecular beam epitaxy (MBE) method for high structural and electronic quality complex oxide thin films and heterostructures. Jalan’s group employs a novel MBE technique for thin film growth, direct and complimentary tools (x-ray diffraction, scanning probe microscopy, advanced electron microscopy, spectroscopy techniques) for structural characterization, and a physical property measurement system for low temperature transport, and magnetic measurements to investigate structure-property relationships, and to develop basic knowledge needed to understand basic physics via different approaches including band structure, band-gap and strain engineering. Work in the Jalan group is highly interdisciplinary in nature and has a strong collaborative component between materials scientists, chemists, physicists and electrical engineers.

Jalan was recently selected as a recipient of the American Association for Crystal Growth Young Scientist Award, which will be presented to him at the upcoming 21st American Conference on Crystal Growth and Epitaxy (ACCGE-21) to be held in Santa Fe, New Mexico on July 30-August 4, 2017. The AACG Young Scientist Award is given to an early career scientist working in the fields of crystal growth research, development, practice, theory, modeling, characterization, application or production to recognize his or her outstanding scientific and technical contributions in the field of crystal growth. Jalan was selected for the award based on his scientific excellence, clarity of presentation and impact on the field of crystal growth. As an award winner, Jalan will present a plenary talk at the conference and receive a monetary award, complimentary conference registration and a plaque commemorating this award.
Congratulations to these CEMS students who earned Master’s or Ph.D. degrees during AY 2016-17.

Sachin Agarwal (M.S., MSE)
Advisor: Russell Holmes
Siddharth Chanpuriya (Ph.D., ChE)
Synthesis and Phase Behavior of Tetrablock Terpolymers.
Advisor: Frank Bates
Cha-Jung Chen (Ph.D., ChE)
Vapor Phase Hydrodeoxygenation of Lignin-Derived Phenolic Monomers to Aromatics on Transition Metal Carbides Under Ambient Pressure.
Advisor. Aditya Bhan
Dong Seong Cho (Ph.D., ChE)
Exploration of Primitive Endoderm Cells with Transcriptome Analysis.
Advisor: Wei-Shou Hu
Co-Advisor: Catherine Verfaillie
Joseph DeWilde (Ph.D., ChE)
Kinetics, Mechanisms, and Site Requirements.
Advisor: Aditya Bhan
Abel Demissie (Ph.D., MSE)
Advisor: Dan Frisbie
Prabesh Dulal (M.S., MSE)
Novel Garnet and Gold Thin Films for Photonic and Plasmonic Applications.
Advisor: Bethanie Stadler
Kathryn Geldart (Ph.D., ChE)
Engineering Antimicrobial Probiotics for the Treatment of Vancomycin-Resistant Enterococcus.
Advisor: Yiannis Kaznessis
Matthew Irwin (Ph.D., ChE)
Advisor: Timothy Lodge
Pooja Jambunathan (Ph.D., ChE)
Engineering Nonphosphorylative Metabolism for the Biosynthesis of Sustainable Chemicals.
Advisor: Kechun Zhang
Minje Kang (Ph.D., ChE)
Kinetics and Mechanisms of Alcohol Dehydration on Metal Oxide Catalysts.
Advisor: Aditya Bhan
Rachit Khare (Ph.D., ChE)
A mechanistic understanding of light olefins selectivity in methanol-to-hydrocarbons conversion on MFI.
Advisor: Aditya Bhan
Christoph Krumm (Ph.D., ChE)
Finding the Chemistry in Biomass Pyrolysis: Millisecond Chemical Kinetics and Visualization.
Advisor: Paul Dauenhauer
Panagiota Kyriakou (Ph.D. ChE)
Computational Insights into the Antimicrobial Mechanism of Action of Class II Bacteriocins.
Advisor: Yiannis Kaznessis
Meryl Lewis (M.S., MSE)
Kinetics, Mechanisms, and Site Requirements.
Advisor: Aditya Bhan
Tuqi Li (Ph.D, MSE)
Realizing Enhanced Toughness in Block Copolymer Modified Brittle Plastics.
Advisor: Frank Bates
Co-Advisor: Lorraine Francis
Abdulla Abdul Rahman Malek (Ph.D., ChE)
Modeling and Dynamic Optimization of Microalgae Cultivation in Outdoor Open Ponds.
Advisor: Prodromos Daoutidis
Alexander Mannion (Ph.D., ChE)
Rheological Design of Sustainable Block Copolymers.
Advisor: Chris Macosko
Co-Advisor: Frank Bates
Alyssa McKenna (Ph.D. MSE)
Photo-induced Structural Dynamics of Molybdenum Disulfide.
Advisor: David Flannigan
Nathan Morgan (Ph.D., ChE)
An Engineered Approach to Specialty Chemicals Purification.
Advisor: Russell Holmes
Co-Advisor: Ed Cussler
Jeffrey Peterson (Ph.D., MSE)
Understanding Growth Rate Limitations in Production of Single-Crystal Cadmium Zinc Telluride (CZT) by the Traveling Heater Method (THM).
Advisor: Jeffrey Derby
Neel Rangnekar (Ph.D., ChE)
Characterization of Hydroxypropyl Methylcellulose Acetate Succinate Solid Dispersions in the Solid-state and During Dissolution.
Advisor: Timothy Lodge
Co-Advisor: Marc Hillmyer
David Riehm (Ph.D., ChE)
Advisor: Alon McCormick
Karl Schliep (Ph.D., MSE)
The Investigation of New Magnetic Materials and Their Phenomena Using Ultrafast Fresnel Transmission Electron Microscopy.
Advisor: David Flannigan
Co-Advisor: Jianping Wang
Morgan Schulze (Ph.D., ChE)
Block Polymer Self-assembly and Applications.
Advisor: Marc Hillmyer
Teresa Sells (M.S., ChE)
Advisor: Kevin Dorfman
Co-Advisor: Frank Bates
Kyle Snow (M.S., ChE)
Advisor: David Flannigan
Lawrence Stern (Ph.D., ChE)
Cellular Selections Aid Translational Binding in Ligand Discovery.
Advisor: Benjamin Hackel
Pranav Kumar Suri (Ph.D., MSE)
Static and Dynamic Electron Microscopy Investigations at the Atomic and Ultrafast Scales.
Advisor: David Flannigan
Co-Advisor: Andre Mkhoyan

Yi-Shu Tai (Ph.D., ChE)
Expanding Primary Metabolism for New Bioproducts: Pathway Design, Enzyme Discovery, and Fermentation Optimization.
Advisor: Kechun Zhang

Yutao Tao (Ph.D., MSE)
Modeling of Particle Envelopment During the Growth of Crystalline Silicon for Solar Cells.
Advisor: Jeffrey Derby

Paul Taylor (M.S., MSE)
Perfluoropolyether Lubricant Depletion and Reflow in Hard Disk Drives.
Advisor: Xiang Cheng

Thu Phan (M.S., ChE)
Advisor: Wei-Shou Hu

Jeffrey Ting (Ph.D., ChE)
Tunable Polymers as Specialized Excipients for Oral Drug Delivery.
Advisor: Frank Bates
Co-Advisor: Theresa Reineke

Jie Tu (M.S., MSE)
Advisor: Xiang Cheng

Bryce Williams (Ph.D., ChE)
Processing of Copper Zinc Tin Sulfide Nanocrystal Dispersions for Thin Film Solar Cells.
Advisor: Lorraine Francis
Co-Advisor: Eray Aydil

Daniel Woldring (Ph.D., ChE)
Constrained Diversification Enhances Protein Ligand Discovery and Evolution.
Advisor: Benjamin Hackel

Blake Wolf (M.S., MSE)
Advisor: Jianping Wang

Yue Wu (M.S., MSE)
Advisor: Jeffrey Derby

Peng Xu (Ph.D., MSE)
Hybrid Molecular Beam Epitaxy of Complex Oxide Heterostructures with Ultrahigh Electron Density.
Advisor: Bharat Jalan

Michael Zachar (Ph.D., ChE)
Advisor: Prodromos Daoutidis

Cheng Zhu (Ph.D., ChE)
Production of Energy and Chemicals by Thermochemical Conversion from Recycled and Renewable Biomass.
Advisor: Paul Dauenhauer

Save the Date!

For local Ph.D. or Post-Doc alumni or those attending AIChE, please consider attending:
CEMS Ph.D. and Post-Doc Alumni Reunion
Sunday, October 29, 2017
5:30 p.m. to 8:00 p.m.
Amundson Hall
Registration is required:
z.umn.edu/cemsphd17

2017 AIChE Annual Meeting
Alumni and Friends Reception
Tuesday, October 31, 2017
Time and Location TBD
CEMS alumni and friends are encouraged to attend, especially those living in the Twin Cities.
Importance of mentors

With mentor opportunities lacking for advanced graduate students, a new program emerges in CEMS.

There are numerous opportunities for undergraduate students to seek guidance and career advice through mentor programs. The need for mentors is no less important at the graduate level, yet similar programs do not often exist. Upon the advice of Ameara Mansour (Ph.D. ChE '11), the CEMS Women’s Group established a mentor program for advanced graduate students in their 3rd, 4th or 5th years to benefit from alumni who could share their expertise on topics such as writing a thesis, identifying career paths, strengthening professional networks, and refining job interview skills.

Positive impact

For Maria McClintock, a fifth-year chemical engineering graduate student, the mentor program will have a tremendous impact on her graduate student experience and future cohorts as well, indicating, “The mentor program creates a support structure necessary for career development. This structure helps students with their Ph.D.s, career planning and mental/emotional well-being. More specifically, a mentor could address those three areas by helping the student to interact more successfully with their advisor, navigating the thesis process, resume writing, preparing a job/post-doc talk or just providing an additional level of support to help students better manage stress associated with graduate school.”

Immediate benefits

The CEMS program was an immediate success, with students being partnered with mentors for the first time in fall 2016. The mentor experience has proved invaluable for students and mentors alike. Damini Gupta, a fifth-year chemical engineering student, remarked, “The most valuable part of the mentor program for me has been learning how to communicate my research to industrial audiences. I had been facing challenges advancing past the first round of interviews in my job search. But, having my mentor provide me with an insider’s perspective, as someone who actually works in industry, I was able to develop effective job interview strategies. My mentor provided me with a great support system to ensure my success.” Similarly, Alyssa McKenna, a fifth-year materials science graduate student, also sought career advice from her mentor. “My mentor provided me with support and a unique perspective, particularly while I was applying to different jobs. For instance, she discussed how she chose her job and suggested some things for me to try to make my first few years successful. I have come to view her as a role model.”

Mentors also benefited from their interactions with students. Some mentor comments submitted as part of a post-program survey include, “It was great to watch my mentee grow over the time we interacted. Building her confidence level and getting her to feel comfortable talking about herself is very rewarding for me. This is a fantastic program for graduate students to build their skillsets before getting into workplaces.” Recognizing that the CEMS graduate student mentor program is vitally important, a mentor remarked, “Thanks for giving me the opportunity to be the mentor I never had in school.”

Taking the initiative to establish a graduate student mentor program has better prepared CEMS graduate students for the challenges they face in their academic careers and professional development in order to achieve long-term success. If you are interested in becoming a CEMS alumni mentor, please contact: cemsalum@umn.edu.
Forward thinking

Ming Gao (MSE’ 17) offered remarks as a student speaker at CSE Commencement.

Here is an excerpt from Gao’s speech:

When I first heard that I was selected as the student speaker, I was in pure happiness for about three seconds. Then I started to panic...what should I talk about? I relate that moment to the mixed feelings we all have as we are graduating from college. After all that hard work in the past few years, we finally see the light at the end of the tunnel…and the light is so bright, that we are not sure if it is the light from the actual end of the tunnel, or the light of a train coming down the track called “the real world.” I learned from my undergraduate experience that instead of having a deep fear of uncertainty, we should look directly into its eyes, and seize all the opportunities we have to transform that uncertainty to the best thing that it could ever be. Many opportunities come as serendipities in life. If we have a high openness to new experience and a willingness to work hard, we will create opportunities.

Serendipities knock on the door more than one time. Starting from my freshman year, I learned that the most important skill for a college student is to find free food on campus. After going to some events hosted by student groups, I realized that I enjoyed the events more than the food. So I became more involved as a board member. It turned out that pure motivation for food gave me the best leadership opportunities. As the event coordinator for Minnesota International Student Association, I had the chance to apply what I learned from my leadership minor to hosting events for over one thousand students. The best opportunities are not planned. They come as serendipities, and if you have an open mind to explore the unknowns, they will surprise you.

However, I don’t consider these opportunities as “luck.” In Chinese, the phrase “good luck” is spoken as “jia you,” which means “to refuel,” or “to work hard.” Instead of thinking some people are “lucky,” I always see them as people who work hard to create more opportunities. You must agree that those 30-page lab reports were not finished because you were lucky. Well, if you handed in the report late anyway because the printer jammed again, then it was just bad luck. Speaking of that, the best lessons are always learned the hard way. We all learned not to do things at the last minute, because WiFi problems always happen right before the 11:59 pm deadline on Moodle. We learned that an open book, open notes midterm doesn’t mean that we don’t need to study, it means we probably wouldn’t even know what page to look at during the test.

Now we are finally graduating, and many of us will go into the industry as scientists and engineers. We have to walk out of the University of Minnesota with full confidence, because our CSE programs have best prepared us to find the solutions, and we are ready for the paths ahead. All your hard work has made you who you are, and you ARE ready.

Without the inspiration of our professors, we would not be here today. And how often do we thank them? Probably as much as we say thank you to our parents. So... not enough. Please allow me to speak for all of the graduates as I give our appreciation to all of our professors. Thank you for believing in us, challenging us, and thank you for encouraging us to become lifelong learners. We also appreciate all the friends and families who have come to commencement today to support us and witness this great moment of our lives. We are the accumulation of our successes, failures, and memories, and rarely do we experience any of these alone.

Thank you for sharing the last four years with me. Congratulations, Class of 2017. That light at the end of the tunnel is definitely true. Go seize it.
Fellowships enable education

Generous alumni and friends transform the lives of our graduate students.

Each year, philanthropic fellowship support gives new graduate students the breathing room to find the work in which they truly excel—instead of worrying about whether the research they love has funding attached. To maintain its promise to fully fund the first year of each incoming graduate student, CEMS must continue to enhance its fellowship resources. Please join our community of steadfast supporters or consider renewing your commitment to the fellowship program.

Elisah VandenBussche, ChE
Phyllis Brown Branin Endowed Fellowship

For most of my life, I thought I wanted to be a professional violinist. I poured in years of practice, calloused fingers and frustrating lessons. I did well enough in school, but I only saw a future for myself in music. Then a high school chemistry teacher came along and changed that. Through creative and open-ended lab assignments, I discovered that the skills I’d learned through playing the violin were applicable in more than just music lessons. The discipline required to learn all of the boring, basic dexterity exercises before putting all of the skills together to play a beautiful concerto, was the same as the discipline required to memorize equations and learn thermodynamics, so that these basic principles could be applied to a new and interesting problem in the lab. The collaboration of a string quartet, where each member must contribute their own part in order to create a cohesive piece of music, was the same as the collaboration required of each member of a lab group in order to ensure the success of the experiment and the safety of the experimenters.

My passion for music never left me, but during that time I discovered two new life goals: to use the skills I had learned both in school and in music to keep learning, keep experimenting, and keep innovating, and to pay forward the effect of one very enthusiastic and creative chemistry teacher by helping other young people discover their passion for science. Both of these goals can be full time jobs, but my experiences at Case Western Reserve University during my undergraduate career showed me very quickly that university professors fill both the roles of cutting-edge researcher and life-changing mentor, helping me define my long-term career goal and decide to attend graduate school.

Choosing CEMS

I visited several schools when making my decision about where to complete my Ph.D., and it was immediately obvious to me that the University of Minnesota was the right one. The fairly unique combination of materials science and chemical engineers in this particular department will allow me to do cutting-edge research at the interface of these two fields. I plan to apply the background I have gained during my undergraduate career to make some impact on materials research and build a foundation upon which I can construct a research program of my own. The incredible resources of the University of Minnesota and of this department specifically will allow me to complete research I’d never considered possible, working with cutting edge techniques like ultrafast electron microscopy to study fundamental questions about materials dynamics and transport, whose answers can advance and even redefine current fields of study.

Impact of fellowship gifts

When I arrived, I had a broad goal in mind but had absolutely no idea who I wanted to work for or in what specific area. The flexibility provided by fellowship funding allowed me to take my time choosing the right advisor and focusing on classes without financial stress. This has set me up to be more confident in my decision
and helped me lay a solid foundation for my future research by putting time into my coursework, so I’m very grateful for your generosity.

**Ellie Raethke, MSE**  
**Materials Science Graduate Fellowship; First-Year Graduate Student Fellowship; L.E. and D.H. Scriven Fellowship**

I grew up in the small town of Pepin, Wisconsin on my family’s dairy farm, and I am the oldest of three children. My father works as a dairy farmer and my mother is a registered nurse at a nearby college. I attended the University of Wisconsin-Stout for my undergraduate degree in Applied Science with a concentration in Materials and Nanoscience. Growing up on a farm, I became aware of how science and engineering impact our daily lives, and at U.W.-Stout I was able to explore this interest through student clubs and undergraduate student research. Eventually, I found that I was most interested in the field of materials science because it allowed me to gain a deeper understanding of the materials all around us and has applications in a wide range of fields.

I ultimately decided to pursue graduate school after completing a summer Research Experience for Undergraduates at the University of Minnesota. During this internship, I gained a better sense of the roles and everyday duties of graduate students, as well as the scope of research that you can complete during the course of graduate studies. I realized that graduate school would provide me the opportunity to pursue research for the sake of science, and allow me to interact with peers who were also passionate about the subject. I plan to complete my Ph.D. in 2021, and after graduation, I plan to pursue a career in industry working in research and development. I have truly enjoyed the sense of community that I feel in the CEMS department; it has started to feel like a second home.

**Selecting UMN**

I decided to attend the University of Minnesota for many reasons. I was enticed by the wide range of ongoing research and the spirit of collaboration that is evident throughout the department. I joined a collaborative research project that is co-advised by Cari Dutcher and Phil Buhlmann. The project is working on the development of polycationic electrochemical sensors for use in flocculation experiments for water treatment. The ultimate goal is to make the water supply cleaner through removal of a higher amount of contaminants, both organic and inorganic. I also liked the Twin Cities and how CEMS is very centrally located on campus. Another big draw for me to Minnesota’s CEMS department was that I would have an opportunity to spend an entire semester getting to know different professors, research areas and projects before I decided which advisor I wanted to work for. This fellowship allowed me to take my time in making a decision about my research group and alleviated concerns that I had about not having enough time or information about research groups, and finding one (or more) that was the right fit for me. Overall, I am excited about graduate school and the many opportunities it provides for my future. During the process of acquiring my Ph.D., it’s my goal to become a better researcher, become more involved in the department and to discover my personal passion in research.

**Giving matters**

I would like to thank you for contributing to CEMS fellowships. I really love the University of Minnesota, and fellowship support allowed me to have sufficient time to meet with professors to discover a research project and identify a research group that aligned with my interests. I am co-advised and couldn’t be happier with my decision, and your fellowship gift provided me with enough time to make an informed decision about my educational path and future career. For that, I am truly thankful.

**Ways to give**

1. Online: http://z.umn.edu/cemsgift
2. “Give to CEMS” button on CEMS website: www.cems.umn.edu
3. Contact Courtney Billing: 612.626.9501 or cbilling@umn.edu
A lasting legacy

Professors Bill and Sue Gerberich establish endowed chairs in CEMS and School of Public Health.

Professor Bill Gerberich, a long-time supporter of the department and its graduate student fellowship program, has made an extraordinary commitment to establish the William Warren Gerberich Endowed Chair in Materials Science. This gift was inspired by Bill’s steadfast dedication to ensuring the department’s legacy of expertise and excellence in the field of materials science.

Bill’s generosity is matched by that of his wife, Professor Sue Gerberich, who made a similarly remarkable commitment to the School of Public Health to establish the Susan Goodwin Gerberich Chair in Injury Epidemiology and Prevention. Sue also has a long tradition of supporting graduate fellowships in the School of Public Health.

Friends and alumni of the department are invited to assist in launching the endowed chair by making a contribution to the fund in honor of Professor Gerberich’s 46 years of teaching and research excellence in CEMS. To learn more, please contact Courtney Billing at cbilling@umn.edu or 612.626.9501.

Give to CEMS and receive: Charitable gift annuities

For donors 55 and older wishing to support CEMS, charitable gift annuities may be the ideal vehicle to make a gift while receiving the benefits of fixed annual payments for life and taking an immediate income tax deduction.

With a gift of cash or publicly traded securities, the U of M Foundation (UMF) pays you (or up to two people you designate) a fixed amount annually for life. The remaining assets are used to support CEMS and the program of your choice.

With a charitable gift annuity:

- The minimum amount to fund a gift annuity is $10,000.
- The income beneficiaries must be 55 years of age or older when payments begin.
- Payments, guaranteed by UMF, can be made to you, or up to two people you designate.
- Payout rates are based on age; typically the older the income beneficiaries are when the gift is made, the higher the rate. Payments can be deferred to receive a higher payout rate in the future.
- In most instances, a portion of each annuity payment is tax-free.
- You can claim an immediate income tax deduction for a portion of the gift, subject to applicable limitations.
- You can save on capital gains tax if you use appreciated securities to fund the gift annuity.

For more information, or to receive a personalized gift annuity illustration, contact Courtney Billing at cbilling@umn.edu or 612.626.9501.
Graduate fellowships

Fellowship funding serves as the cornerstone of CEMS graduate programs.

The First Year Graduate Student Fellowship Initiative
Aditya Banerji, John Dewey, Daniel Du, Michael Karavolias, Charles McCutcheon, Ankita Naik, Ellie Raethke, John Roering, Matthew Simons, Yuxiao Wu, Yueke Yang, Yichao Zhang

Neal Amundson Fellowship in Chemical Engineering and Materials Science
Tiffany Lam

Neal R. and Shirley D. Amundson Fellowship
Tiffany Lam

James Andrews Fellowship
Daniel Du

Rutherford Aris Endowment Fund
Kaicheng Shi

Rutherford Aris Memorial Fellowship
Yueke Yang, Yichao Zhang

Bill and Marcia Ball Fellowship
Ziwei Wang

Frank and Janis Bates Fellowship
Yuxiao Wu

Laurence W. Booher Fellowship
John Dewey

Phyllis Brown Branim Endowed Fellowship Fund
Elisah VandenBussche

Phyllis B. Branim Fellowship
Patrick Lown, Chance Parrish, Matthew Simons

Lap and Jody Chan Fellowship
Panayiotis Kolliopoulos

Howard W. and Mary S. Cox Fellowship
Harish Venkatachalapathy

Ed and Betsy Cussler Fellowship
Aditya Banerji

Erling A. Dalaker Fellowship
Harish Venkatachalapathy, Ziwei Wang

H. Ted Davis Fellowship
Sahithi Gorthy, Christian Pinnell

Gary and Helen Dowling Fellowship
Ting-Pi Sun

Arnie Fredrickson Fellowship Fund
Cain Valtierrez-Gaytan

Fridley Fellowship
Gaurav Kumar, Vineet Maliekkal, Costas Papageorgiou, John Roerig

Lynn Frostman and Mike Zum Mallen Fellowship
Michael Karavolias

William Warren Gerberich Fellowship in the Solid Mechanics of Plasticity and Fracture
Claire Morgan

Herbert S. Isbin Fellowship
Vineet Maliekkal

Kaler Family Fellowship in Chemical Engineering and Materials Science
Matthew Simons

Kenneth H. Keller Graduate Fellowship
Yangming Kou

Usba Kumar Fellowship
Sahithi Gorthy

Jan J. and Sofia Milner Laskowski Fellowship
Ankita Naik

Chris and Kathleen Macosko Fellowship
John Roerig

Materials Science Graduate Fellowship
Ellie Raethke

Robert V. Mattern Fellowship Fund
Costas Papageorgiou

George Philippidis Fellowship in Biochemical Engineering
Tiffany Lam

Peter and Gene Pierce Family Fellowship Fund
Vineet Maliekkal

Dr. Doraisswami and Mrs. Geetha Ramkrishna Fellowship in Chemical Engineering
Shaaaz Khatib

William E. Ranz Fellowship Fund
Daniel Du

Sebastian C. Reyes Fellowship
Charles McCutcheon

Stephen J. Salter Fellowship Fund
Aditya Banerji, Vasileios Charitatos, Cain Valtierrez-Gaytan, Shaaaz Khatib, Panayiotis Kolliopoulos, Yangming Kou

L.E. and D. H. Scriven Research Fellowship Fund
Ellie Raethke, Ting-Pi Sun

Jacqueline and Richard Schmeal Fellowship
Shaaaz Khatib

Lanny and Charlotte Schmidt and Duane Goetsch and Nancy M. Dickerson Fellowship
Paridhi Agrawal, Gaurav Kumar

Nancy Scott and Kevin Gromley Fellowship
Vasileios Charitatos

Bill and Triana Silliman Fellowship
Yueke Yang

Marvin S. and Norma V. Sivertsen Fellowship
Ian Curtin

Thomas R. and Yolanda Shirley Stein Fellowship
Gaurav Kumar

Curtis M. and Joyce P. Stendahl Graduate Fellowship
Harish Venkatachalapathy

Robert and Beverly Sundahl Fellowship
Ian Curtin

The Teletzke Family Fellowship
Szu-Ming Yang

Matthew Tirrell Fellowship
Patrick Lown

Pat Whitcomb and Patty Napier Fellowship
Yangming Kou
Spanning generations

Arthur Fong (M.S. ChE ’82) inspired his daughter, Heather (ChE ’17) to pursue a CEMS education.

Heather Fong

About 40 years ago, my father set foot into Amundson Hall to start his new life as a chemical engineering graduate student. He had just received an offer from 3M’s Corporate Research Process Laboratory after graduating from the University of Colorado-Boulder. To make my father a stronger research and development asset for the company, 3M offered to pay for his graduate school. There was also a bit of trepidation from him to move from a beautiful mountainous city to brave the wastelands of an arctic winter. Attending school for another couple of years was also not desirable for a newly graduate. However, all these concerns were thrown out once he began taking courses in the department.

My dad’s experiences in the CEMS department were what convinced me to attend the U to pursue chemical engineering and later, chemistry. Although going through the major was extraordinarily intellectually challenging, the journey has been incredibly rewarding. I have learned to utilize my aptitude in physics, mathematics, and chemistry to solve complex kinetic, thermodynamic, and separation problems. I have been mentored and taught by experts in the forefront of polymer processing and synthesis, biological engineering, and catalysis. I have also became friends with many incredibly bright and ambitious students who flourished within this department. I have no doubt that they will be successful in whatever career path they take. My dad visited Amundson Hall again in May to celebrate my graduation. As I leave this university in pursuit of a full time position in chemical engineering, I know that I have made the right choice.

Art Fong

After seeing the movie “A Beautiful Mind” based on the life of John Nash, Heather asked me if such people exist. I told her about the process control class I took from Professor George Stephanopoulos. In our class, there were three foreign graduate students who would complete the test in less than fifteen minutes and get a perfect score. The remaining students would be lucky to complete two out of the three problems in the allotted fifty minutes. Eventually, these three “beautiful mind” students would help Professor Stephanopoulos change and improve the math equations during lecture and offer new insights that would contribute to his research. One day, when those three extraordinary students were not in recitation, Stephanopoulos overheard the remaining students discussing who would be getting the lower grades when based on a curve. Stephanopoulos spoke up and told us that to encounter one exceptionally brilliant student is usually a once in a lifetime event, but to have three is rather unbelievable. He assured us that the lowest grade in his class will be a B and that he did not want to penalize us for learning at a slower pace. When I reflect back on this moment, I realize that there were really four “beautiful minds” in the class; the other one being Professor Stephanopoulos.

Before the Fukushima, Chernobyl, and Three Mile Island nuclear disasters, Dr. Herbert S. Isbin foresaw how nuclear reactor accidents could contaminate the environment and render the surrounding areas unusable - Plutonium 239 has a half-life of 24,100 years.
IN RETROSPECT

A lifetime of service and dedication

Military service interrupted Eugene Morath, Jr.’s chemical engineering career, but a new scholarship honors an enduring commitment to education at the University of Minnesota.

When the late Lieutenant Colonel Eugene Morath, Jr. (1921-2016), began his studies of chemical engineering and chemistry at the University of Minnesota in 1940, it was made possible through the generosity of his Aunt Eleanor Margaret Minor. A National Honor Society member, Morath pursued his studies in chemical engineering until 1944 when his ROTC class was called to active duty in World War II before he was able to graduate.

A distinguished career in the army followed, with tours of duty in Korea, Vietnam, and service to the American Embassy in Rome. Morath later went on to receive a B.S. degree from the University of Maryland in 1955 and an MBA degree from Lehigh University in 1959, and was elected to Beta Gamma Sigma, the Phi Beta Kappa of Schools of Business and Commerce. Upon retiring from the Army as Lieutenant Colonel in 1971, he was Vice President of Resources Engineering, Inc., a Washington DC based engineering consulting firm which developed overseas resource projects funded by the State Department’s U.S. Agency for International Development Program.

His experience at the University of Minnesota, and his appreciation for his aunt’s incredible generosity inspired Lt. Col. Morath to support students who shared his passion for chemical engineering and chemistry, and dedication to service. The Eleanor Margaret Minor Scholarship, honoring the Class of 1944, will support students who are pursuing a double-major in both chemical engineering and chemistry. CEMS students often pursue double-majors with chemistry, with 23 of the 120 graduating chemical engineering class receiving a dual degree.

Spanning generations continued from page 20

Although nuclear power is relatively clean in terms of greenhouse gas pollution, there is substantial risk for the surrounding environment if the reactor becomes unstable. Dr. Isbin saw these risks and the radiation contamination leakage pathways. In the case of nuclear fallout, knowledge of these pathways can prevent the spread and the loss of human life. I was privileged and fortunate to have him as my Master’s project advisor.

Dr. Chris Macosko taught me to view polymers as springs and dashpots components. I applied this thought process to develop polymers with specific properties. In medical ultrasound imaging applications, I realized that by mixing the right amount of fillers, springs and dashpots, acoustically transparent materials can be created with impedance to match human tissue.

Dr. Gerberich taught metallurgy and I utilized the imparted knowledge on grain boundary dislocation and cold flow to improve the transesophageal echocardiography (TEE) probe reliability. The TEE probe has steering wires brazed to the probe tip for ultrasonic imaging of the heart. Using a stronger braze material solved the problem of steering wires pulling loose from the probe tip.

The University of Minnesota has visionary professors that can paint a picture with chemistry, physics and math to give a bigger view on how the world works... similar to the “Frog in the Well” Chinese story - the frog saw the world as the small opening at the top, but CEMS opened your mind to see beyond the walls. Heather knew I got a few patents by seeing things differently and wondered how I got mentally programmed to see the world this way.

After hearing about the great professors, brilliant students and CEMS’ nationally recognized top ranking, Heather decided on Minnesota for chemical engineering. She had never been to Minnesota nor experienced the wrath of a harsh winter climate. Somehow, I convinced her to pick Minnesota (a school 1000 miles away) over some good, convenient chemical engineering schools in Colorado.
My most memorable experience as a CEMS undergraduate was the cohesiveness of the class and the sense of humor that we had. It made all the difference in classes when we were able to laugh together. Upon graduation, I will attend graduate school at MIT for a Ph.D. in chemical engineering, and I’m excited for the opportunity to apply what I learned to conduct further research in my graduate studies.

Isaac Johnson [ChE ’17].

My most memorable experience was in junior year Unit Ops. I had to work closely with people I didn’t know at all. We had a few disagreements and frustrations at the beginning, but we learned how to work together effectively. At the end of the semester, we scrambled to get Professor (Joe) Sullivan a retirement gift at the same time our report was due. Upon graduation, I will work as a Technical Problem Solver on the Technical Services (TS) Team at Epic Systems in Madison, Wisconsin. I am really excited to live in downtown Madison and explore the social scene there. I think my skill set will match the job well, and I will be able to accomplish a lot.

Seamus Jones [ChE ’17].

During the last day of Unit Ops lab, my sweater got stuck on a relief valve in the gas membranes experiment, which caused a small, but loud air leak. Professor Azarin nearly had a heart attack as she looked for the source of the noise. I don’t think I will ever forget the panicked look on her face. Upon graduation, I will attend graduate school at the University of California, Santa Barbara to pursue a Ph.D. in chemical engineering. I’m excited to apply the skills I’ve developed to some practical problems and to take a role in educating undergraduates at my new institution.

Jennifer Timm [ChE ’17].

It is easier for me to reflect on the past four years of college as a learning experience. There are so many things I learned, both technical and relational, as a student in the chemical engineering program. The last two years really challenged me in every aspect of my life, and because of it, I have a wider appreciation of the field, relationships, and life as a whole. It was a valuable experience, and I’m glad I stuck it out. After graduating, I will be starting at Emerson as an Inside Sales Engineer in Chanhassen, Minnesota. I’m very excited to start this position and transition into business roles. I would like to move into Outside Sales after getting some experience, and I plan to obtain my MBA in a few years and guide my career path toward company leadership. The chemical engineering program was so rigorous that I will definitely enjoy a nice break that will come with graduation and a steady work schedule.

In Memoriam

Robert D. Bowman [ChE ’56] on November 2, 2016.
Alice Chen Gessner [M.S. ChE ’50] on October 15, 2016.
Robert E. Martinson [ChE ’57] on October 18, 2016.
got to travel the world, and secured what for me was the ultimate job. I’ve been at NIST now for 24 years and plan to be here until I too retire, within about 10 years. I don’t think I have the energy that Bill has, to continue working and contributing as much as he does!

Perhaps most importantly, I learned from him just how critical it was to strike a healthy balance of priorities in my life. For example, it was never all about grades or prestige or getting the approval of others. And it wasn’t about having to follow traditional recipes for success. I met my future spouse, Michelle Vig, as a result of Bill’s efforts to encourage her to join the materials science program. We now have two daughters (ages nine and nearly seven), who wouldn’t be here otherwise.

1991

Witold Zielinski (M.S. MSE ’91).

It was a privilege to work for Professor W.W. Gerberich. His great scientific knowledge and constant pursuit of valuable research results obliged me to work hard. This led to a very productive period in my career. In my memory, Professor Gerberich will forever remain as a great scientist and a valuable advisor. He required a strong orientation on scientific results, but his interactions with students were based on mutual respect. He also used to organize activities for his students, like this unforgettable event that occurred on USA Independence Day of July 4th, 1989.

1995

Stefanie Harvey (Ph.D. MSE ’95).

There is no way I could thank Bill for all he has done for me -- he taught me how to do research, how to speak publicly, how to write. I owe a great debt to him for my career, my love of Indian food, and an appreciation for calligraphy.

Erica Lilleodden (MSE ’96).

Bill Gerberich changed my life. Not to sound too dramatic, but it’s true. It was back in 1993 after I struggled to find any scientific stimulation from organic chemistry – a requirement for the chemical engineering degree I was pursuing – when I enrolled in Gerb’s 3400 class to try out materials science. That was it. I was hooked. But more than that, it was that summer that Bill got me started in research. Not just any research. Nanoindentation. And it still serves as the work horse experimental setup I use – and which my students use, and now even my students’ students use. But that’s just a research field. And while for that introduction I am truly grateful to Bill, his significance to me is so much more. It’s personal. He really was just so motivated and supportive – always ready with a new idea, a new way to plot the data, and new theory to explain an observation. His group, the Gerb alumni, the students that came much later – we really are a family, meeting for dinner at conferences, supporting each other through collaborations. I think I had promised Bill I would return from Stanford as a post-doc (which didn’t happen – sorry!) but I still find time to visit him at Amundson Hall during family visits to Minnesota. And who knows, maybe I’ll come back for a sabbatical. Despite the formality of retirement, I am quite sure I will find Gerb still busy in his office, stacks of papers around him and ready to wax philosophical about theoretical strength.


Daniel Gurovich (Ph.D. ChE ’01), Drew Davidock (Ph.D. MSE ’04), Lisa Lim (Ph.D. MSE ’05), Jianbin Zhang (Ph.D. ChE ’07) and Teri Hermel-Davidock (Ph.D. MSE ’03)

On behalf of the five CEMS graduate department alumni who now work for R&D in the Medication and Procedural Solutions business at Becton Dickinson and Company. Professor Gerberich impacted us all in different but positive ways during our graduate work. He was Lisa Lim’s “independent” reviewer for her thesis and was always supportive, spending time to help her even though he was not her advisor. I, Teri Hermel-Davidock, had Prof. Gerberich as my co-advisor, and I remember the engaging conversations around the application of fracture mechanics to multi-block copolymer systems. He gave me a unique perspective to polymer structure-property relationships which I have carried with me through my career. Professor Gerberich, we wish you all the best on the next chapter in your life. You have been a foundation of the CEMS graduate programs for years, and we thank you for the generations of researchers you have developed, mentored and inspired.
Join Us!

CEMS Homecoming & Class of 1992 25th Reunion
Saturday, October 21, 2017
Lunch, Tours, Graduate Student Poster Session, Research Updates
11:30 a.m. to 2:30 p.m. in Amundson Hall
Class of 1992 (Bachelor’s, Master’s or Ph.D.) should arrive at 11:00 a.m. for 25-year reunion events
Homecoming Football Game
2:30 p.m. or 3:00 p.m. at TCF Bank Stadium (game time still TBD)
Online registration and tickets required: z.umn.edu/cemshomecoming17

Ph.D. and Post-Doc Alumni Reunion
Sunday, October 29, 2017
5:30 p.m. to 8:00 p.m.
Program, Tours, Reception in Amundson Hall
Local CEMS Ph.D. and Post-Doc alumni or those attending the 2017 AIChE Annual Meeting in Minneapolis are invited to attend a Ph.D. and Post-Doc alumni reunion in Amundson Hall.
Online registration and tickets required: z.umn.edu/cemsphd17