Letter from the Chair

Dear Alumni, Students and Friends,

One of the highlights of this past year was our interviewing for a long-awaited fifth faculty position in our Materials Science and Engineering program, which led to the successful hiring of Assistant Professor Samrat Choudhury from Los Alamos National Laboratory in the area of computational design of advanced materials, including but not limited to electronics and energy applications. To the best of my knowledge, this is actually a landmark event for the University as Dr. Choudhury brings a very broad range of materials simulation and modeling expertise to UI for the first time.

Perhaps the next highlight of the year is simply but profoundly the outstanding fashion in which our faithful supporters continue to come through every year with increasing impact to fund our scholarships for graduate and undergraduate students, for design team challenges and international competitions, for laboratory support and pushing toward full funding for The Lou Edwards Endowed Chemical Engineering Chair, which of course is a long-term yet extremely important goal for our department as state funding keeps falling short. Our second funding target for the near future is growing our graduate student programs. The most probable mechanism (tried-and-true) by which an academic institution grows is by investing in research, and the graduate student population is key to the success of both that endeavor as well as President Staben’s primary goal of growing undergraduate enrollment by 50% in the next ten years. A study of other growing academic programs shows that in most cases sustained enrollment growth follows monetary investment. I think of Outstanding senior Breanna Wong (BS ChE 2015) who was recruited to Washington State University for graduate studies in Chemical Engineering, and our heart-felt congratulations to her! But this great success for Breanna also contrasts for me with a personal regret that we could not offer her a competitive research assistantship to keep her. We need to do better, and this should be a focus for us all in the coming years.

Design teams led by Dr. Drown and his collaborators are still winning (see page 2), in part thanks to all of you who continue to support their projects; new grants and contracts keep coming as well, and the extra gifts that you give to our development funds have been put to excellent use recently for graduate student support and shop and lab upgrades (see impact statements by Charles and James below).

We look forward to your visits, comments, suggestions, questions, and stories at any time throughout the year. As everyone keeps extremely busy, we would appreciate some warning before you drop by the office, if you happen to be in the neighborhood, because we certainly do not want to miss the chance to catch up with you.

Please update your contact information with us at che@uidaho.edu or mse@uidaho.edu. —-Eric

Critical Use of Gifts to the Department

The Instrument Shop stays busy supporting our researchers and senior design projects. We completed some much needed upgrades on our first Computer Numerical Control (CNC) milling machine (‘97). A very robust and precision machine tool with hundreds of projects completed. This machine has proven reliable for 18 years, but was in need of some modernization. At the heart of the machine was a 486 DOS PC with 640kb of memory and a floppy disk to load programs. Insufficient memory for complex shapes and programming limitations could not accomodate our newer CAD/CAM versions. Rather than a $40,000 replacement machine, we opted to maintain the still excellent mechanical parts by retrofitting control, servo motors, and encoders (Centroid CNC). Now with greatly increased capabilities through a Windows 7 based controller for only $11,400. We continue to enjoy our reliable milling machine with older tooling and modern features. I would really like to thank the donors to the development fund that made this control upgrade possible. —-Charles Cornwall cornwall@uidaho.edu

In part due to generous donations received to the department, we have greatly increased our analytical capabilities allowing us to better educate students and compete for research dollars. Through a combination of luck and timing, Vivek and I acquired a new (to us) inductively coupled plasma mass spectrometer (ICP-MS) from the Center for Advanced Energy Studies (CAES), Idaho Falls allowing the department the ability to measure elemental composition from a liquid sample for anything with atomic masses heavier than boron on the periodic table in the low parts per billion (sometimes part per trillion) range. ICP-MS is one of the most sensitive and flexible techniques for elemental analysis known. It is also ($50-200 per sample), so having our own instrument should save us money. Soon to come, also from CAES, we will have a laser ablation (LA) sample introduction system for the ICP-MS, allowing elemental measurements of solids and semi-solids. Additionally, a recently ordered gas chromatograph with mass spectrometer (GC-MS) will allow vastly improved forensic identification and characterization of a variety of liquid and gas phase samples. With these instruments (LA-ICP-MS, GC-MS) we have the ability to characterize solid, liquid, and gas samples for a variety of applications. We’re excited to begin pushing the limits of these instruments!

—-James Moberly, ChE jgmoberly@uidaho.edu

Charles Cornwall was selected for an Outstanding Staff award in May 2015. Awards are given to staff that have shown exemplary dedication and have gone above and beyond their normal job duties at the UI. Katherine Aiken, Interim Provost, Charles Cornwall.
We competed in the WERC design contest (2015) with two task teams: Seniors Kai Coldsnow, Rachel Peterson, Cody Satterthwait, Breanna Wong, and junior Josh Roper took 1st place entering Task 4 “Radiative Cooling to Night Sky”. Seniors Meshari Ali, Jassim Alshammari, Jocie Cracroft, and Hannah Law took 2nd place entering Task 2 “Just a Portion of Absorption”. Micron, BP Alaska, Boise Wallula mill, Visual Mesa, and Pan American Silver helped sponsor these entries along with the UI Office of Sponsored Programs and the Chemical & Materials Engineering Department alumni plus student’s parents. Following the competition in New Mexico they toured White Sands National Monument, Hueco Tanks State Historic Park, and the El Paso Zoo. Both WERC teams won awards at the College of Engineering Design Expo for best oral presentations, while the Task 4 WERC team won an award for outstanding booth presentation. The “Development of Prototype Miniaturized Spectrometer for Decagon Devices, Inc.” design team won an award for outstanding booth presentation. Our Chem-E-Car team and “Fueled by Trash” senior projects also had booths at the EXPO.

—Dave Brown, ChE ddrown@uidaho.edu

**Thesis Defense titles:**

**Jeffrey S. Fischer** M.S. Ch.E. Aug 7, 2015
Polyoxometalate Cores in Hybrid Nano-Building Blocks for Extreme Ultra-Violet Photoresists

**Brandon Hardie** M.S. Ch.E. Aug 7, 2015
Silsesquioxane Hybrid Nano-building Blocks for Extreme Ultra-violet Photoresists

**Natalie M. Kirch** M.S. Ch.E. Aug 7, 2015
Synthesis of Polymeric Precursors for Refractory Carbides and Borides

**Michael Opoku** M.S. M.S.E. May 15, 2015
Coprecipitation Synthesis of Superplastic 3 Mole %Yttria-Stabilized Tetragonal Zirconia Polycrystalline/ Magnesium Aluminate Spinel Nanocomposite

**Expected to graduate 2015-16:**

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We could not have done it without you!

—Mark Roll, Advisor mroll@uidaho.edu

Dr. Aston presented a plaque for her accomplishments at our annual Advisory Board meeting in May 2015.

—Raja Krishnan, MSE ksraja@uidaho.edu

Kalyan Chitrada, our MSE grad student received the following awards/recognition this year:

1. Outstanding Publication by a Student Award recipient for the College of Engineering, 2015

—Raja Krishnan, MSE ksraja@uidaho.edu

I am pleased to share that our students (Sharon Strom, Derek Probst, Eric Hughes – CE graduate students in environmental engineering; Ben Carleton – ChE graduate student in environmental engineering) placed 2nd in the national student design competition (waste water treatment design category) at WEFTEC-Chicago. They were competing against 9 other university teams. Our team was representing both UI and the Pacific NW Clean Water Association (PNCWA; a member association of the Water Environment Federation, for Oregon-Washington-Idaho).....they had previously won the PNCWA competition as well. This is the first time ever that a team from UI has competed at WEFTEC (the annual conference for WEF; 20,000-25,000 attendees).

—Erik Coats, CE, Affiliate Faculty ecoats@uidaho.edu

**Design Projects**

**Back row L-R:** Jocie Cracroft, Rachel Peterson, Breanna Wong, Hannah Law.

**Front row L-R:** Cody Satterthwait, Josh Roper, Jassim Alshammari, Kai Coldsnow, Meshari Ali.

This year the Student Paper Night of the ASM Inland Empire Chapter was held at the UI. Six undergraduate research talks were presented, three from UI, three from WSU. Colin Lunstrum took 2nd Place for his talk titled: “Investigation Into the Use of β-Bi2O3 for Solar Hydrogen Generation by Water Splitting”, while Robert Blair took 3rd Place for his talk “Water Permeability and Corrosion of Rebar in Concrete: Doubling the Life of Concrete by Addition of Glycerol (Anhydrous) and Nanosilica Admixtures” and Isaac Curtis “Exploring Fundamental Molecular Dynamics Simulations for Materials Research” was recognized for his contributions. All students received cash prizes courtesy of the ASM Inland Empire Chapter.

—Mark Roll, Advisor mroll@uidaho.edu

Please update your email address with us so you can continue receiving our newsletters! che@uidaho.edu or mse@uidaho.edu

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**Breanna Wong, B.S. Ch.E. May 2015**

Chemical Engineering Outstanding Senior

Breanna was selected as the ChE Outstanding Senior by vote of her peers and faculty for the 2014-15 school year.

Dr. Aston presented a plaque for her accomplishments at our annual Advisory Board meeting in May 2015.

—Dave Brown, ChE ddrown@uidaho.edu
is to "plant, grow, and harvest" graduate students from our own well-trained undergrads, optimizing use of funding.

Dr. Utgikar continued work on two research projects funded by the Nuclear Energy University Program (NEUP, DOE): one on modeling the Advanced Nuclear Reactor-Intermediate Heat Exchange system, and a second on off-gas treatment for spent nuclear fuel reprocessing operations. He published four refereed papers, and his research group made a total of six presentations at the national meetings of the American Nuclear Society.

---Vivek Utgikar, ChE vutgikar@uidaho.edu

**Mark Roll's Research Group** - Nathan Wilkerson, Natalie Kirch, Jeffery Fischer, and Brandon Hardie earned MS degrees, while two new research grants have started, including a New Investigator award from the Petroleum Research Fund managed by the American Chemical Society and an SBIR grant through the Office of Naval Research (PI Herb Hess, Electrical and Computer Engineering). With two Ph.D., one MS and four undergraduate research assistants, the current year will be very exciting!—Mark Roll, MSE mroll@uidaho.edu

**Soumya Srivastava** received a SEED grant to promote her research with Microfluidics, Electrokinetic-based bio-Separation and Analysis (MESA). This is a BSL II level lab for working with human tissue. She needs to work with a medical doctor from a local hospital and is still looking. She currently uses bovine cells through WSU Veterinary center. Her focus is cancer research, to develop point-of-care diagnostic devices for early detection and also on educational research including enhanced student engagement and learning. Awards and honors this year include:

- The National Academy of Engineering (NAE) selected her as one of 70 of the nation’s most innovative, young engineering educators.
- She was also selected for NETI and the inclusive educator award by WEPAN (Women in Engineering ProActive Network) in June 2015 (http://www.wskc.org/eitawards) and is among the top 50 in the nation to attend the National Effective Teaching Institute (NETI) workshop: Richard Felder, Rebecca Brent (Seattle, WA, June 2015).
- She was a co-PI on a new DOE-funded project that will study creep-fatigue behavior of Alloy 709.

---Soumya Srivastava, ChE srivastavask@uidaho.edu

Dr. Samrat Choudhury to the department and the MSE program! Ph.D. in Materials Science and Engineering, 2008 The Pennsylvania State University, University Park Masters in Engineering in Metallurgy, 2000 Indian Institute of Science, Bangalore, India Bachelors in Engineering in Metallurgical Engineering, 1998 Regional Engineering College, Durgapur, India

---Samrat Choudhury, MSE samrat@uidaho.edu

**James Moberly** and undergrad Zachary Beaman worked on a project to reduce electricity bills for dairy cow farmers by harvesting energy from gases found in manure, which is shoveled into an anaerobic digester for conversion into liquid and gas byproducts. The liquids are rich in nitrogen and phosphorous for potential fertilizers. The gases produced include methane, which can be pumped into a generator to produce energy.

---James Moberly, ChE jmoberly@uidaho.edu

**Indrajit (Indy) Charit** continues to serve both MSE and NE programs. His research focus remains on processing/structure-properties correlations in the context of energy materials. While he continues to lead two research projects funded by the Department of Energy (DOE) and National Energy Technology Laboratory (NETL), he is happy to report that he will serve as a co-PI on a new DOE-funded project that will study creep-fatigue behavior of Alloy 709. Indrajit’s two MS students (Ankan and Cody) are working hard to complete their MS degrees. This fall, he welcomed a new MS student, Anumat. Brazilian exchange students Joao, Sam & Barbara with undergraduates Mark & Ben also worked in lab this year. During 2015 spring break, he visited India and delivered lectures at the Indian Institute of Technology (IIT) - Kharagpur and Indian Institute of Engineering Science & Technology (IIEST), Shibpur as part of the ASM-IM Visiting Lectureship Award. He hopes this paves the way toward collaborations. He assumed a two-year chairmanship of the TMS (The Minerals, Materials and Metals Society) Nuclear Materials Committee in the first part of 2015. He has been busy co-authoring a new book titled ‘Mechanical Behavior of Materials: Deformation and Design’ (Elsevier, 2016). Indy wishes all newsletter readers the very best!

---Indrajit Charit, MSE ichtarit@uidaho.edu

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**Drs. Srivastava and Moberly** received an NSF EAGER grant for 2 years to study organisms that hyper-accumulate metals (OHMs) specifically targeting rare earth elements. Proposed developments toward a microfluidic platform for rapid screening of OHMs for identification and separation would significantly enhance and accelerate screening and development of microorganisms used in biosorption of all types, not just specific to metals, providing a “greener” and potentially more cost effective technological solution for separation challenges.

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2015 Academy of Engineers Inductees:

Keith Van Scotter, B.S. Ch.E. UI 1977; M.S. Ch.E. UI 1979. Currently President and CEO of Maine’s Lincoln Paper and Tissue LLC (LP&T)

George M. Simmons, B.S. Ch.E. UI 1965; M.S. Ch.E., UI 1966; Ph.D. Ch.E. Stanford University 1970. Professor Emeritus at the University of Idaho and Dean Emeritus of Seattle University’s College of Science & Engineering.

Tidbits:

1965 (50 years ago) UI awarded their first Ph.D. It was in Chemical Engineering.

1955 (60 years ago) the first woman received a B.S. in Chemical Engineering at the UI.