



MSEP Cougs



Materials Science & Engineering

Fall 2018

In the news...

Research (click the link)

[Fires burn, Cauldrons Bubble](#)

[WSU uses recycled carbon fiber to strengthen permeable pavement](#)

[A Little Robotic Submarine could ply Alien Seas](#)

[Sodium battery research could provide cheap, effective lithium alternative](#)

[WSU, PNNL strengthen research ties to shape the future](#)

Alumni

[Craig Owen, 2017 December Graduate](#)

[Jose Marcial, 2017 December Graduate](#)

[TriboTEX Winner of Defense Innovation Award 2017](#)

Director's Corner



Hello colleagues and friends of the Materials Science and Engineering Program (MSEP) at Washington State University. This is the first of what we hope to be a regular (twice yearly to start) communication to you about what's going on in the MSEP at WSU. My name is John McCloy, and I am the current director of the program, serving since the beginning of 2017. I am a professor in the School of Mechanical & Materials Engineering (MME) in the Voiland College of Engineering and Architecture (VCEA), having joined WSU in 2013. As you probably know, the MSEP is an interdisciplinary program at WSU, and we currently have 35 affiliated faculty from three colleges, including VCEA, College of Arts and Sciences (CAS), and the College of Agricultural, Human, and Natural Resource

Sciences (CAHNRS). These faculty are primarily from MME, the Department of Chemistry, and the Department of Physics, with a few in Civil and Environmental Engineering, Chemical Engineering, and Textiles. Our student body is holding steady at about 60 for the last few years, and we graduated 17 new PhDs in academic year 2017-18, bringing the total to 124 PhDs awarded since our program started in 1992. One glance at the thesis titles (see page 2) shows the exciting breadth of materials research happening at WSU. Our intention is to let you know a bit about one or more students, faculty members, and program alumni in these letters. This could include things like significant awards, papers, research, internships, or other noteworthy news. We have a lot of exciting things going on at MSEP, including participation in several pro-

grams joint with nearby Pacific Northwest National Laboratory (PNNL), including three joint PNNL-WSU institutes and a distinguished graduate student program where students spend part of their research at PNNL. Please reach out to us at msep@wsu.edu with news, job opportunities, interest in helping with seminars or recruiting, or other ways to support your program. Go Cougs!



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\$1.7 million x-ray microscope to unleash WSU materials research

WSU is the first US university to operate the new ZEISS Xradia Ultra 810, a state-of-the-art X-ray nano-computed 3-D tomography instrument. The unique microscope can create three-dimensional models of a material's interior down to 50 nanometer resolution. Such preci-

sion will enable researchers across the university to design more efficient and powerful components for technologies ranging from batteries and solar cells to drug delivery methods that use nanoparticles to target cancerous tumors. It also will provide faculty a competitive

advantage when applying for future research grants. The instrument is operated by the Center for Materials Research and available for fee-based use by academic and industry partners. For more information or to schedule time on the instrument, contact cmr@wsu.edu.

Alumni Spotlight: Dr. Raj Poudel

“My focus during my graduate career was to study transport properties of transmembrane proteins in mimicking membrane systems”



I was born and raised in Kathmandu, Nepal. I received my undergraduate degree in Physics from Simpson College in Indianola, IA. From there, I went on to get a PhD. in Materials Science and Engineering from Washington State University. My focus during my graduate career was to study transport properties of transmembrane proteins in mimicking membrane systems. The biological work I did during my graduate school career influenced me to transform my research career more towards cell biology, which was the reason why I joined the Bai Lab. Research Membrane remodeling is an active process that may govern important cellular processes such as trafficking, signaling, endocytosis. I am very interested in understanding how proteins that remodel membranes to influence cellular morphology, do so. Particularly, I am interested in how these proteins function so in high stress environments with extreme precision and accuracy. I am utilizing a combination of biophysical and electron microscopy techniques to explain their working mechanism. When not in the lab, I love to take pictures. I don't mind driving several hundred miles to snap some pictures that may never leave my camera. I am also an avid sports fan, particularly football and basketball. I eat a lot of different kinds of food.

MSEP Doctoral Graduates: 2017-2018 Academic Year

- **Morteza Adinehnia:** Structure-Function Correlation of Photoactive Ionic p-Conjugated Porphyrin Structures (Hipps)
- **Bryan Borders:** Optoelectronic Properties of Self-Assembled Binary Porphyrin Nanostructures (Mazur)
- **Yue Cao:** A Study of Magnetic Non-Destructive Evaluation for Degradation Detection in Nuclear Steels (McCloy)
- **Saehwa Chong:** Characterization of Sodalite Based Waste Forms for Immobilization of I-129 (McCloy)
- **Bradley Fromm:** Phase Field Based Microstructure Reconstruction for Reactor Materials (Field)
- **Shaofang Fu:** Nanostructured Electrocatalysts for Oxygen Reduction and Evolution Reactions (Lin)
- **Xiaojie Guo:** Mechanochemical Modification of Lignin and its Application for Thermoplastics and Thermosets (Zhang)
- **José Marcial:** Compositional Dependence of Glass Corrosion Due to the Crystallization of Nepheline (McCloy)
- **Jedidiah McCoy:** Implementation of ACRT in Vertical Bridgman Growth of Non-stoichiometric CZT for Radiation Detection (Lynn)
- **Craig Owen:** Tin Nanoneedles for Li-Ion Batteries: Growth Mechanisms, Thickness, and Phase Control (Norton)
- **Ian Richardson:** Characterizing Dissolved Gases in Cryogenic Liquid Fuels (Leachman)
- **Brian Riley:** Aluminosilicates for the Capture and Immobilization of High-Halide Wastes from Used Nuclear Fuel Reprocessing (McCloy)
- **Darman Rock:** Shear-Aligned Carbon Nanotube Mats (Kessler)
- **Qirong Shi:** Engineering Nano-Structured Electrocatalysts for Fuel Cells and Water Splitting (Lin)
- **Ke Xu:** Correlation Between Irradiation Damage and Micro-Magnetic Properties for Reactor Steels (McCloy)
- **Tiecheng Zhou:** Network Analysis Algorithms and Applications to Understand Aqueous Solutions and their Interfaces (Clark)
- **Parissa Ziaei:** Silica Nanostructure Platform for Affinity Capture of Tumor-Derived Exosomes and other Medical AP (Norton)

Student news

- Xuewei (Ella) Fu received the outstanding MSEP graduate student award for scholarship. Indranath Mitra was the outstanding student for service.
- Matthew Athon, MSEP Student won best overall poster at the Institute of Nuclear Materials Management (INMM) conference at the PNNL Nuclear Materials Science, Processing and Signature Discovery Workshop.
- Xuewei (Ella) Fu won 2nd place at the Voiland College of Engineering Three Minute Thesis competition and won First Place in the Student Poster contest at the 2018 JCATI Symposium.
- Muad Saleh and Mostafa Ahmadzadeh serve on the President's Council of Student Advisors for the American Ceramic Society
- Michael Kindle won second place in the student poster contest at the American Ceramic Society Glass and Optical Materials Division meeting.
- Emily Nienhuis attended the International Commission on Glass (ICG) summer school in Montpellier, France.
- Mostafa Ahmadzadeh received the R. G. Post \$5000 scholarship for nuclear waste management.
- Yu-Chung (Jerry) Chang received an internship from Apple in California.



Jose Marcial and Emily Nienhuis at Notre Dame in Paris, after presenting at the Physics of Non-crystalline solids meeting in St. Malo, France

Faculty news

- Hang Liu became the first MSEP faculty member from the College of Agricultural, Human, and Natural Resource Sciences (CAHNRS). Prof. Liu works in Textiles and is affiliated with the Composites Materials and Engineering Center (CMC).
- Susmita Bose was named a fellow of the National Academy of Inventors (NAI) and the Materials Research Society (MRS).
- Yuehe Lin was among four WSU faculty elected to the Washington State Academy of Sciences
- John McCloy was elevated to Fellow of the American Ceramic Society and received the society's Richard M. Fulrath Award to promote US-Japan cooperation.

Prof. Yuehe Lin was among 4 WSU Faculty elected in 2018 to the Washington State Academy of Sciences (WSAS). Other MSEP members of the academy include Profs. Bandyopadhyay, Bose, Hipps, and Lynn.

Alumni news

LOST ALUMNI

If anyone can give us any information or whereabouts of the following alumni, we'd love to know what they are up to!

- Abdulaziz Alamr (2005)
- James Densley (1998)
- Boxiong Ding (2005)
- John Hardy (2011)
- Jianying Ji (2013)
- Tae Hwan Jung (1992)
- Kalyanasundaram Kannan (1997)
- Tae-Jin- Kim (2007)
- Jun Li (1996)
- Xi Li (2005)
- Xing Lu (1997)
- T Sarathy (1997)
- Gurmurthy Sundar (1996)
- Yan Yu (1999)
- Ke Zhang (1996)
- Mingqin Zou (2001)



Prof. Katie Zhong works closely with students to create next-generation battery and bio-based composite materials



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Donate to MSEP Cougs!

<https://materials.wsu.edu/giving-to-msep/>

Materials Science and Engineering is an exciting field with far-reaching impact across a myriad of disciplines. Pursuing our passion for studying, designing, and developing new materials that enable novel technologies, we exert direct influence on all aspects of modern society, including energy, environment, health, information, infrastructure and security. MSEP students and faculty at WSU perform research at the fore-front of each of these areas. No matter your predilection, your imagination and creativity will find an outlet in our midst. We welcome passionate students, collaborators, and friends who want to be leaders in discovery and invention in the wonderful world of Materials. Let us be your guide as we lead you and prepare you for a life directed by reason and enlightened by service and compassion.

Program news

In the last year, we have been focused on making small changes to our already outstanding MSEP program to better serve the students and faculty in our program.

First of all, we have made modifications to the curriculum, emphasizing 10 core areas from which students must select at least one course from at least 3 of these areas. By increasing the delineation of these areas, we were able to promote a larger number of course options, offered in multiple departments. The core areas determined by the faculty are: Thermodynamics/Kinetics; Solid State; Quantum Mechanics; Materials Processing; Materials

Characterization; Advanced Chemistry; Solid Mechanics; Transport; Multi-component Systems; and Applied Mathematics.

Additionally, we made some changes to our graduate seminar, encouraging all graduate students to present in this forum to their peers the semester they plan to graduate. Additionally, we have been able to attract some outstanding speakers to our recent seminar series, including representatives from: Argonne National Laboratory, Pacific Northwest National Laboratory, Lawrence Livermore National Laboratory, Oregon State University, University of Colorado, Cal State Northridge,

Microsoft, Amazon, and Blue Origin. Let us know if your organization or company is interested in coming to talk to us about the exciting work in materials you are doing.



Central campus at twilight. Courtesy of WSU Photo Services.