



Materials Science & Engineering News

Spring 2015

FACULTY SPOTLIGHT



Wu Group
Discovers New 2D
Semiconductor

3

STUDENT SPOTLIGHT



Meet Mingxi
Zheng, rising MSE
Master's student and
President of the
Materials Science &
Engineering Association

2

FACULTY SPOTLIGHT



Professor Xu
Recognized for
Research on Quick Self-
Assembling Thin Films

3

Visit Us!



LinkedIn MSE at UC Berkeley

WWW.MSE.BERKELEY.EDU

FROM THE CHAIR'S DESK...

Greetings from the Department of Materials Science and Engineering at UC Berkeley!



Chair Mark Asta

The past two years have seen the addition of three new MSE Faculty members. Dr. Jie Yao joined the MSE faculty in August, 2013, bringing to the department new expertise in the area of optical materials and nanophotonics. Professor Yao received his PhD in Applied Science & Technology from Berkeley, and worked as a postdoctoral fellow at Stanford. In August, 2014, Dr. Lane Martin joined Berkeley MSE as an Associate Professor, bringing new expertise in growth, characterization and application of advanced functional materials. Professor Martin received his PhD from Berkeley MSE, and prior to returning to Berkeley, served as an Assistant Professor at the University of Illinois, Urbana-Champaign (UIUC). Also in August, 2014, Dr. Phillip Messersmith joined Berkeley as the Class of 1941 WWII Memorial Chair Professor, in a joint position with the Department of Bioengineering. Professor Messersmith received his PhD in MSE at UIUC, and prior to coming to Berkeley was a Professor at Northwestern in the Departments of Biomedical Engineering, Materials Science and Engineering, and Chemical and Biological Engineering. Professor Messersmith's research focuses on structure-processing-property relationships of materials in biological systems, and the biomimetic design of soft materials for applications in biomedicine and beyond.

MSE also welcomed the addition of three new Adjunct Faculty: Drs. Joel Ager, Elke Arenholz and Haimei Zheng, all of whom hold staff scientist positions at Lawrence Berkeley National Laboratory (LBNL). Each is contributing through the teaching of advanced graduate courses, the development of new collaborative research programs, and mentorship of our graduate students. Additionally, Professors Ager and Zheng, as well as Professors Wu and Doyle, have represented our department in Singapore as PIs in the Singapore Berkeley Research Initiative in Sustainable Energy (SinBeRISE). This initiative was launched in 2013, as a collaboration between Berkeley, the National University of Singapore and the Nanyang Technological University. The project is being directed by Matt Sherburne who is also serving as a lecturer in the department.

We are adjusting to the recent retirements of Professors Andy Glaeser and Ron Gronsky. Professor Glaeser retired in June, 2014, marking the end of 33 years on the MSE faculty. Professor Gronsky retired in December, 2014, after 41 years of service to the campus. Both were awarded the prestigious Berkeley Citation upon their retirement in

Continued on page 2

recognition of their outstanding contributions to teaching, service and research throughout their careers at Cal. For Professor Gronsky, this award was given personally by Chancellor Dirks, following a spirited performance by the Cal Band in the Hearst Mining Building Lobby! We are thankful that both Professors Gronsky and Glaeser have left the door open to continue their active involvement with MSE for years to come.

It was with great sadness that we experienced the loss of three legends from the MSE faculty over the past two and a half years: Professors Alan Searcy, Gareth Thomas, and Jack Washburn. Each were true pioneers in their fields, and they are greatly missed by their former colleagues, friends and students.

The research of our faculty continues to receive recognition internationally, as summarized in the Faculty Awards and Recognition section, where we also note that MSE faculty have continued the long tradition of service in our department, by assuming key leadership positions on campus and at the LBNL.

Over the past three years the size of the undergraduate program has grown steadily, to a current total enrollment of 235 students across our Major and five Joint Major programs. Under the leadership of Professor Chrzan, our ABET accreditation was renewed last year. Last year our Department also became the administrative home of the Applied Science and Engineering Graduate Group, with approximately 80 faculty participating from across campus. The graduate group is chaired by Professor Chrzan. The addition of two new staff members, Ms. Liz Purdy and Ms. Ariana Castro, has been enormously helpful in seeing us through this period of growth.

I hope this note gives a sense that it is a truly exciting time for Berkeley MSE. Please note in the Upcoming Events this year's edition of the Dow Distinguished Lecture in Materials Science & Engineering. This year's speaker is Dr. Ellen Williams, who is currently the director of ARPA-E at DOE. You are all invited to attend! In future Newsletter issues we will also plan to highlight the work of our alumni, and so we hope to hear from you soon! We will be announcing soon a number of initiatives to re-engage with our alumni. Stay tuned!

STUDENT SPOTLIGHTS

Shishir Pandya, *Ph.D. Candidate*



Members of the Martin Group celebrate the best poster award. (Photo courtesy of Lane Martin)

Graduate Student Shishir Pandya (Lane Martin Group) was recognized with a Best Poster Award at the Spring 2015 Materials Research Society (MRS) meeting in San Francisco. His poster, entitled “Novel Routes to Strain Engineer Domain Structures and Properties in Epitaxial $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$ Thin Films” showcased exciting new advances in how to control and understand complex materials.

Mingxi Zheng, *Rising Master's Student*

What made you want to major in MSE?

I didn't start off as an MSE Major; I changed my major because of an internship I had after my freshman year. I worked on characterization and fabrication of OLED devices, and had the opportunity to work with a few materials engineers. It was a really exciting experience, and I liked how hands-on it was, so I decided to change my major!



Photo by Matt Beardsley

What organizations/groups are you involved in on campus?

Over the past few years I have been involved in the Society of Women Engineers, Association of Women in EE&CS, Innovative Design and Engineering Student Council. I have held officer roles for some of these groups in the past, but now most of my energy is focused on the Materials Science and Engineering Association, of which I currently serve as President.

What are your future academic and/or career goals?

I will be entering into the BS/MS program, so I will be continuing my studies in MSE for one more year. In the past I have worked mostly with biomaterials, but this summer I will be trying something new with my internship with SpaceX. I am open to see where that experience takes me.

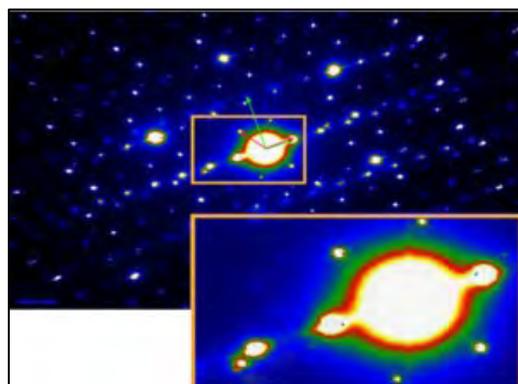
FACULTY SPOTLIGHTS

Professor Junqiao Wu

Associate Professor

Prof. Junqiao Wu's group has discovered a new two-dimensional (2D) semiconductor, Rhenium disulfide (ReS_2). Unlike molybdenum disulfide and other well-studied dichalcogenides, ReS_2 behaves electronically as if it were a 2D

monolayer even as a 3D bulk material. This not only opens the door to 2D electronic applications with a 3D material, it also makes it possible to study 2D physics with easy-to-make 3D crystals. This work was published in *Nature Communications*.



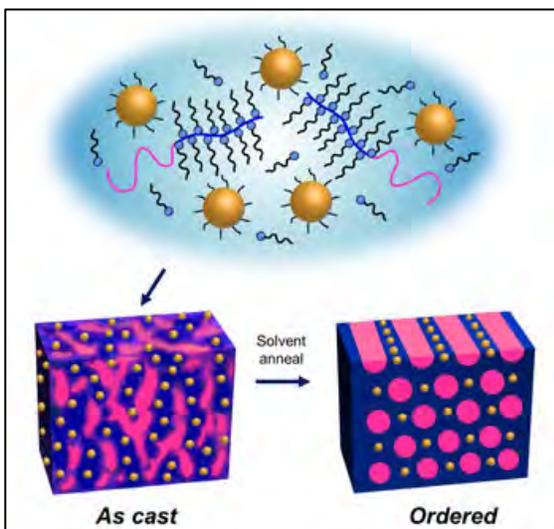
Nano-beam electron diffraction pattern of rhenium disulfide with zoom-in insert image reveals a quasi-hexagonal reflection pattern

Professor Ting Xu

Associate Professor

Professor Xu recently reported in *Nature Communications* a new technique for the accelerated generation of nanoparticle assemblies. The technique enables self-assembly processes that normally requires

hours to order up, to be formed in just one minute. Professor Xu, MSE Faculty member and polymer scientist with the Lawrence Berkeley National Laboratory's Materials Sciences Division, led a study in which this technique was devised. Supramolecules based on block copolymers were combined with gold nanoparticles to create nanocomposites that quickly self-assemble into highly ordered thin films under solvent annealing. The achievement opens up exciting possibilities for nanomanufacturing and for development of metamaterials for applications spanning solar energy to nanoelectronics.



Upon solvent annealing, supramolecules made from gold nanoparticles and block copolymers will self-assemble into highly ordered thin films in one minute. (Photo courtesy of LBNL)

FACULTY AWARDS & RECOGNITION

2015

Professor Andrew Minor awarded Burton Medal from the Microscopy Society of America

Professor Fiona Doyle Appointed Dean of the Graduate Division

Professor Miguel Salmeron receives Davission-Germer Prize from the American Physical Society

Professor Oscar Dubon continues third year as the Associate Dean for Equity and Inclusion to the College of Engineering

Professor Kevin Healy continues fourth year as Chair of the Berkeley Bioengineering Department

Professor Ramamoorthy Ramesh assumes position as the inaugural Associate Director for the new Energy Technologies Area at LBNL

2014

Professors Junqiao Wu, and Lane Martin join Berkeley alum Dr. Jeremy Robinson as recipients of the Presidential Early Career award for Scientists and Engineers

Professor Robert Ritchie receives Acta Materialia Gold Medal Award

Professor Digby MacDonald receives Frumkin Medal from the International Society of Electrochemistry

Professor Andrew Minor named Acting Director for the National Center for Electron Microscopy at LBNL

2013

Professor Kevin Healy elected as a Fellow of the American Association for the Advancement of Science

Professor Digby MacDonald receives Gibbs Award from the International Association on the Properties of Water and Steam

UPCOMING EVENTS



Saturday April 18, 2015 • 9am-4pm

Cal Day

Location: Campus Wide

*MSE Activities will be held in Hearst Memorial Mining Building Lobby 12-4pm



Thursday, April 30, 2015 • 4-5pm

Dow Distinguished Lecture in Materials Science & Engineering,

Speaker: Dr. Ellen Williams- Director of the Advanced Research Projects Agency-Energy

Location: Sibley Auditorium



Monday, May 18, 2015 • Baccalaureate 9am | Graduate 2pm

College of Engineering Commencement Ceremony

Location: Hearst Greek Theatre

MATERIALS SCIENCE AND ENGINEERING ASSOCIATION (MSEA)

What is MSEA?

MSEA is the main undergraduate student organization for students studying, or interested in Materials Science and Engineering. MSEA puts on academic, professional and social events for students on campus. Their aim is to create a stronger sense of community between the students, faculty, and staff.

Every month, MSEA holds a “Dinner of the Month”, where faculty members are invited to dinner with students at a local restaurant. This year, MSEA has a sponsorship with SanDisk, who sends representatives to the dinners as an added networking opportunity. In addition to these dinners, MSEA also holds informational sessions and professional development events with other industry partners and campus organizations.

Get in touch with MSEA:

UC Berkeley, MSEA

Email: mseaatcal@gmail.com

Office: 312 Hearst Memorial Mining Building

GIVE TO MSEA!

Established in 1868 as the College of Mining, the Department of Materials Science and Engineering is UC Berkeley’s oldest engineering department and has been educating some of the world’s best engineers for nearly 150 years. Today, gifts from friends of the department continue to play a vital role in our success. We welcome—and appreciate—your generous support.

To give or speak with a gift officer, please contact us:

Engineering College Relations
308 McLaughlin Hall #1722
Berkeley, CA 94720-1722
P: (510) 642-2487, E: <mailto:bef@coe.berkeley.edu>

CONTACT US!

Share your ideas, accomplishments and events for the next MSE Department Newsletter. We would love to hear from you!

Liz Purdy, External Relations Specialist
lizpurdy@berkeley.edu