



A. JAMES CLARK SCHOOL OF ENGINEERING

DEPARTMENT OF MATERIALS SCIENCE
& ENGINEERING

TECHTRACKS NEWSLETTER

FALL 2019

MEET OUR NEW CHAIR



Ji-Cheng "JC" Zhao is the new chair of Materials Science and Engineering (MSE) at UMD. Dr. Zhao arrived from The Ohio State University (OSU) where he served as an MSE Professor for roughly a decade, and Associate Chair for four years. Prior to that, Zhao was a materials scientist and project leader at GE Global Research. From 2014 - 2017, he took leave from OSU to serve as a program director at the Advanced Research Projects Agency-Energy (ARPA-E). Zhao is a Fellow of ASM International and the Materials Research Society (MRS). His research focuses on high-throughput materials science methodologies, determination of phase diagrams and other materials properties, computational thermodynamics, and design of advanced alloys and coatings. Zhao also pioneered the development of a diffusion-multiple approach and co-developed a few materials property microscopy tools for accelerated materials discovery and development. The invention of ultrafast laser materials property microscopy by the Zhao-Cahill team was a finalist for the 2018 Berthold Leibinger Innovationspreis. Zhao holds 48 issued U.S. patents and was the 2001 winner of the prestigious Hull Award from GE Global Research. In fact, an alloy he co-invented is widely used in GE gas turbines. Zhao also serves as a board of trustee of ASM International.

LEAVE A FOREVER LEGACY WITH MSE AT UMD

Scholarships have a profound impact on the lives of student recipients. Numerous MSE students qualify for need-based financial aid and are often forced to take out loans or accrue unsecured debt. Financial aid resources for current and future MSE students are quite limited. This is especially acute as we look to expand our undergraduate enrollment to augment our educational impact on society.

Scholarships allow us to attract, develop and graduate the most promising students to be the next-generation innovators. MSE alumni and donors have the power to transform the student experience - to reward excellence and alleviate financial pressure, empowering students with new opportunities and turning imagination into innovation.

You have the opportunity to establish an endowed, personalized scholarship for a student through a gift of \$50,000 or more. Gifts may be pledged over 5 years, and we will work with you to determine the scholarship parameters and to help you create your desired philanthropic impact.

Invest in MSE at UMD today, and leave a forever legacy named after you, a beloved family member, or a teacher who helped usher your success!

Contact **Aaron Bobik** (abobik@umd.edu) for more information.

MSE RESEARCH GRACES PRESTIGIOUS COVERS



Klein tunneling enables engineers, led by **Ichiro Takeuchi**, to design more uniform quantum computer components, sensors and other devices: go.umd.edu/klein-tunneling



A research team led by **Liangbing Hu** created nano-particles composed of up to eight elements typically known to be unmixable until now. Visit: go.umd.edu/NP-shock



A rare piece of atomic history landed on **Tim Koeth's** desk in 2013, marking the beginning of an investigation into the secrets of the two-inch square cube. go.umd.edu/cube

ALUMNA PROFILE: ASHLEY RUTH

Ashley Ruth (Ph.D. '15) is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE) for 2019. Established in 1996, the PECASE is the highest honor offered by the U.S. government to scientists and engineers who show exceptional promise early in their careers.

"I'm truly honored to receive this award along with so many outstanding leaders in science and technology," said Ruth. "I'm thrilled that I am able to perform this work for the U.S. Army where my contributions can benefit the Warfighter."

Ruth always excelled at math and science, but was undecided when she was first accepted to UMD. She attended an open house on campus to explore her options. After watching Robert Briber's demonstrations, she was hooked on materials science.

"Dr. Briber knocked it out of the park with the happy/sad balls, the magnet falling through a copper tube, and Nitinol paper clip demos," Ruth said. "I knew MSE was right for me because I just had to find out why these materials behaved that way!"

Thanks to the efforts of Profs Isabel Lloyd and Eric Wachsman, among others, Ruth excelled in her courses and capitalized on an internship at the Army Research Laboratory, which gave way to a full-time position there, and a successful career.

Please help create internship or co-op opportunities for MSE students and email the Chair, **JC Zhao** (jczhao@umd.edu).

To read more about Ruth's accomplishments, visit: go.umd.edu/ruth-pecase

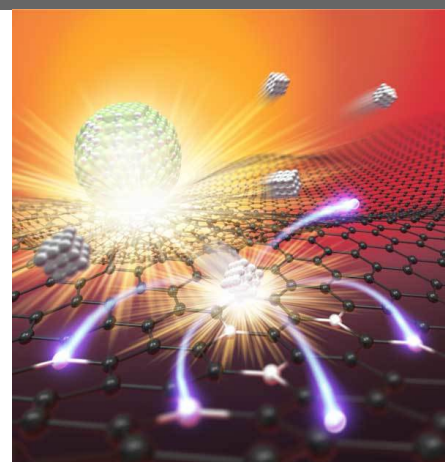


MATERIALS IN THE NEWS

A multi-institutional research team, led by **Liangbing Hu** created a membrane made of a sliver of chemically-treated hydrophobic wood through which water vapor can evaporate, leaving behind particulates, such as salt... which could be the answer to renewably-sourced water cleaning: go.umd.edu/fw-wood.

Hu's research team also published a study in *Nature Nanotechnology* for developing a high temperature shockwave catalysis method, capable of reaching temperatures up to 3000K, intended to "anchor" single atoms onto a substrate, offering superior thermal stability. The efficient technique can be used in catalytic reactions such as methane conversion, opening a general route for single atom manufacturing that is conventionally challenging: go.umd.edu/high-temp-shock

A research group led by **Gottlieb Oehrlein** reported 99% *E.coli* kill on the surface of fresh produce after one minute of treatment in a process called etching - where the layer of the outer membrane of bacteria is removed to kill surface bacteria using electrified air, or plasma: go.umd.edu/GO-plasma



After building their own database, **Ichiro Takeuchi's** research team applied machine learning (ML) to discover and develop new, alternative magnet materials, so research for electric vehicle motors can continue: go.umd.edu/Takeuchi-ML

Yifei Mo uses ML to build "the ultimate battery," including top-notch safety, energy density, life cycle and charging time. Mo and his collaborators use supercomputers to model materials, enabling them to predict how the materials will conduct ion-flow and create electric current, thereby speeding discovery of promising novel solid-state battery materials. To read more on this topic, visit: go.umd.edu/Mo-batt-rev

PROMOTIONS & RECOGNITIONS

PROMOTIONS

Liangbing Hu was promoted to Minta Martin Professor, and **Yifei Mo** and **Marina Leite** to Associate Professor. **Tim Koeth** moved up to Tenure-Track Assistant Professor, and **Amber Johnson** is now the Director of Radiation Facilities.

STUDENT AWARDS

Ph.D. student **Yonggang Yao** received the Caramello Distinguished Dissertation Award for his study, "High Temperature Nanomanufacturing for Emerging Technologies." Undergrad **Thomas Farinha** and Ph.D. Candidate **Dylan Kirsch** were awarded Clark Doctoral Fellowships.