CHEMICAL ENGINEERING DISTINGUISHED LECTURESHIP

Dr. Zhenan Bao

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bit.ly/chem-dl-bao

Passcode: 258705

Skin-Inspired Organic Electronics

Skin is the body's largest organ and is responsible for the transduction of a vast amount of information. This conformable, stretchable, self-healable, and biodegradable material simultaneously collects signals from external stimuli that translate into information such as pressure, pain, and temperature. The development of electronic materials, inspired by the complexity of this organ, is a tremendous, unrealized materials challenge. However, the advent of organic-based electronic materials may offer a potential solution to this longstanding problem. Over the past decade, Dr. Zhenan Bao and her team have developed materials design concepts to add skin-like functions to organic electronic materials without compromising their electronic properties. These new materials and devices enabled a range of new applications in medical devices, robotics, and wearable electronics. In this talk, Dr. Bao will discuss basic material design concepts for realizing stretchable, self-healable, and biodegradable conductive or semiconductive materials. Dr. Bao will also show their methods for scalable fabrication of stretchable electronic circuit blocks. Finally, Dr. Bao will show a few examples of applications her lab is pursuing that are uniquely enabled by skin-like organic electronics when interfacing with biological systems, such as low-voltage electrical stimulation, high-resolution large area electrophysiology, "morphing electronics" that grow with the biological system, and genetically targeted chemical assembly.

ABOUT THE SPEAKER

Dr. Zhenan Bao is department chair and K.K. Lee Professor of Chemical Engineering and, by courtesy, professor of chemistry and professor of material science and engineering at Stanford University. Dr. Bao founded the Stanford Wearable Electronics Initiate (eWEAR) in 2016 and serves as the faculty director.

Prior to joining Stanford in 2004, she was a distinguished member of technical staff in Bell Labs, Lucent Technologies from 1995 to 2004. She received her doctorate in chemistry from the University of Chicago in 1995. She has more than 600 refereed publications and over a hundred U.S. patents with a Google Scholar H-Index >175. Bao is a member of the National Academy of Engineering, the American Academy of Arts and Sciences and the National Academy of Inventors. She is a fellow of the Materials Research Society (MRS), the American Chemical Society (ACS), the American Association for the Advancement of Science (AAAS), the Society of Photo-Optical Instrumentation Engineers (SPIE), the ACS Polymeric Materials: Science and Engineering Division, and the ACS Division of Polymer Chemistry.

Dr. Bao was selected as one of Nature's 10 people in 2015 as a "Master of Materials" for her work on artificial electronic skin. She was awarded the MRS Mid-Career Award in 2021, the inaugural ACS Central Science Disruptor and Innovator Prize in 2020, the Gibbs Medal by the Chicago session of ACS in 2020, the Wilhelm Exner Medal by Austrian Federal Minister of Science in 2018, the ACS Award on Applied Polymer Science in 2017, the L'Oréal-UNESCO For Women in Science Award in the Physical Sciences in 2017, the AICHE Andreas Acrivos Award for Professional Progress in Chemical Engineering in 2014, the ACS Carl Marvel Creative Polymer Chemistry Award in 2013, the ACS Cope Scholar Award in 2011, the Royal Society of Chemistry Beilby Medal and Prize in 2009, and the IUPAC Creativity in Applied Polymer Science Prize in 2008. Dr. Bao is a co-founder and on the Board of Directors for C3 Nano and PyrAmes, both silicon-valley venture-funded start-ups. She serves as an advising partner for Fusion Venture Capital.

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