Mechanical Engineering Department Seminar

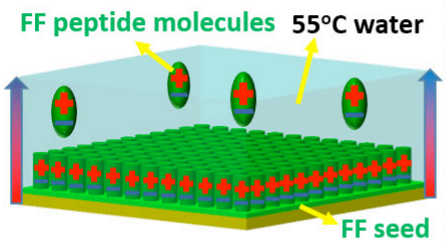
3:35pm September 14, 2016
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

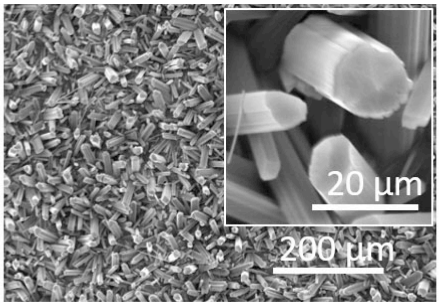
Piezoelectric Nanomaterial: Growth and Applications

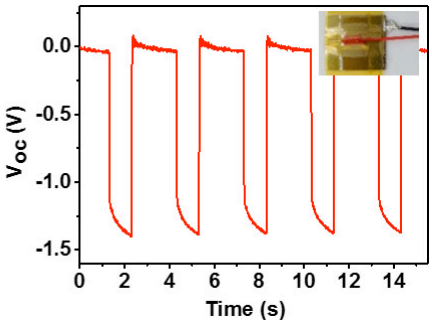
Rusen Yang

Assistant Professor; Department of Mechanical Engineering, University of Minnesota

Piezoelectric ceramics have long been known as powerful media for mechanical-electrical energy conversion. A new twist to this old story starts with the demonstration of piezoelectric nanomaterials and novel nanodevices that showed great potential for next generation nanosystems. Grand challenges in the current study of piezoelectric nanomaterials include the controlled growth of functional nanomaterials, development of powerful nanogenerators, and fundamental understanding of working mechanism in nanodevices. We discovered new processes to achieve nanomaterials with controlled properties. Recently, we successfully synthesized bio-inspired piezoelectric materials with controlled polarization and fabricated the first peptide based energy harvester. We revealed how the resistance of a piezoelectric semiconductor nanowire responded to physical stimuli and reported an ultra-sensitive strain sensor with ZnO nanowire arrays. This presentation will introduce the fundamental principle of these nanodevices and their potential applications.







Bio: Dr. Rusen Yang is an assistant professor in the Department of Mechanical Engineering at the University of Minnesota since 2010. He obtained his M.S. and B.S. in Condensed Matter Physics from Jilin University, China. In 2007, he received his PhD degree in Materials Science and Engineering from Georgia Institute of Technology, where he continued as Post-Doctoral Associate till 2010. He has focused his research on mechanical-electrical energy conversion enabled by nanomaterials and nanotechnology. He has developed new processes to achieve nanowires with controlled orientation and post-growth approaches to align nanostructures. He has opened an in-depth investigation of the piezotronic effect in nanomaterials and created novel devices like nanogenerators and ultra-sensitive sensors. He has published over 60 papers in peer-reviewed journals (citation > 6,000). His transformative work won him NSF Career Award and 3M Nontenured Faculty Award, and he was selected as a McKnight Land Grant Professor in 2013.