



# UNIVERSITY OF CALIFORNIA, IRVINE

*Department of Materials Science and Engineering*

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## Piezoelectric Films for Microelectromechanical Systems



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**Thursday, June 3, 2021, 2:00-3:00 p.m.**

**Zoom: <https://uci.zoom.us/j/98066455796?pwd=ODBUbUxySm9ObHRYWUFEaVIJMFo5UT09>**

**Meeting ID: 980 6645 5796 Passcode: 974689**

**Abstract:** Piezoelectric thin films are of increasing interest in low voltage microelectromechanical systems (MEMS) for sensing, actuation, and energy harvesting. This seminar will discuss how materials are optimized for these applications, as well as examples of the use of piezoelectric films over a wide range of length scales. The key figures of merit for actuators and energy harvesting will be discussed, with emphasis on how to achieve these on practical substrates. For example, control of the domain structure of the ferroelectric material allows the energy harvesting figure of merit for the piezoelectric layer to be increased by factors of 4 – 10. Likewise, control of crystallographic orientation and substrate clamping enables large increases in the figure of merit for actuators. To illustrate the functionality of these films, examples of integration into MEMS structures will also be discussed, including miniaturized ultrasound systems for imaging and particle manipulation, low frequency and non-resonant piezoelectric energy harvesting devices, and piezoelectronic transistors as a potential replacement for CMOS electronics.

**Bio:** Susan Trolier-McKinstry is an Evan Pugh University Professor and Steward S. Flaschen Professor of Ceramic Science and Engineering, and Professor of Electrical Engineering. Her main research interests include thin films for dielectric and piezoelectric applications. She directs both the Center for Dielectrics and Piezoelectrics and the Center for Three-Dimensional Ferroelectric Microelectronics. She is a member of the National Academy of Engineering, a fellow of the American Ceramic Society, IEEE, and the Materials Research Society, and an academican of the World Academy of Ceramics. She currently serves as an associate editor for *Applied Physics Letters*. She was 2017 President of the Materials Research Society; previously she served as president of the IEEE Ultrasonics, Ferroelectrics and Frequency Control Society, as well as Keramos. Twenty-one people that she has advised/co-advised have gone on to take faculty positions around the world.