Micro/Nano Seminar Series
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High Temperature Sensing and Mechanical Logic based on a Silicon Carbide Semiconductor Platform

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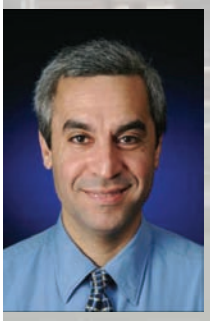
Micro/nano systems enable the development of smart products and systems by augmenting the computational ability of microelectronics with the perception and control capabilities of sensors and actuators. Micro/nano systems are also known as micro- and nanoelectromechanical systems (MEMS and NEMS), and have been commercialized in a wide range of applications including crash sensing, blood pressure measurement, optical projection, and fluid flow control to name a few. Silicon, in single- and polycrystalline forms, has been the platform semiconductor material underpinning the fabrication of the mechanical and electronic elements of micro/nano systems. However, the materials properties of silicon impose limitations on its use in harsh environment and demanding applications for example, those involving operation in the presence of high temperatures, corrosive media, high shock loads, erosive flows, and/or high radiation, or involving performance requirements for the mechanical elements that are beyond silicon's capabilities. Silicon carbide (SiC) is an alternative platform semiconductor material that enables such applications because of its wider bandgap and higher melting/sublimation temperature, elastic modulus, fracture toughness, hardness, chemical inertness, and thermal conductivity. This talk will highlight our most recent SiC material, process, and device advances to enable high temperature sensing and mechanical logic.



Mehran Mehregany received his B.S. in Electrical Engineering from the University of Missouri in 1984, and his M.S. and Ph.D. in Electrical Engineering from Massachusetts Institute of Technology in 1986 and 1990, respectively. From 1986 to 1990, he was a consultant to the Robotic Systems Research Department at AT&T Bell Laboratories, where he was a key contributor to ground-breaking research in microelectromechanical systems (MEMS). He joined the Department of Electrical Engineering and Applied Physics at Case Western Reserve University as an Assistant Professor in 1990. He was awarded the Nord Assistant Professorship in 1991, was promoted to Associate Professor with tenure in 1994 and was promoted to Full Professor in 1997. He held the George S. Dively Professor of Engineering endowed chair (1998 to 2000) and currently holds the Goodrich Professor of Engineering Innovation endowed chair (2000 to present). He served as the Director of the MEMS Research Center (1995 to 2002) and Chairman of the Electrical Engineering and Computer Science Department (January 2003 to January 2006) at Case. He is the Founding Faculty and Director of the Science and Technology Application Center of Case in San Diego, California (July 2007 to present).

Professor Mehregany is well known for his research in the area of MEMS and silicon carbide. He has over 300 publications describing his work, holds 16 U.S. patents and is the recipient of a number of awards/honors. He served as the Editor-in-Chief of the Journal of Micromechanics and Microengineering (January 1996 to December 1997), Assistant-to-the-President of the Transducers Research Foundation (1994 to 2004) and is currently a Trustee of the Transducers Research Foundation and an Editor for the Journal of Microelectromechanical Systems. His current interest is research and development at the intersections of micro/nano-electro-mechanical systems, semiconductor silicon carbide and integrated circuits.