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MSE 690 SEMINAR SERIES

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"Microchemical Sensors for Environmental and Health Monitoring"

Abstract: There remains a strong need for miniaturized, low-power gas sensors that can be deployed in wireless applications for improved environmental protection, for public health, and for safe and efficient operation of many industrial processes. Leveraging the microfabrication technologies and utilizing innovations in high surface area nanomaterials are providing exciting opportunities towards low-power microchemical sensors. In this presentation, I will discuss one of the approaches we have been pursuing, which is based on a highly efficient microheater platform with fast response and recovery times. The design, fabrication and characteristics of this platform will be presented. I will also discuss the use of two-dimensional materials for gas sensing applications since they offer the highest possible surface area for gas interaction, leading to high sensitivity. Assembling these two-dimensional materials into three-dimensional assemblies, such as aerogels, provides a low-density material with large number of interconnected pores that increases the surface area available in a given footprint while maintaining the properties of the few-layer sheets. By integrating these nanomaterials with our microheater platform, we have achieved fast and sensitive detection of several health and environmental pollutants. The talk will end with current limitations and plans for future directions.

Biography: Roya Maboudian is Distinguished Professor of Chemical and Biomolecular Engineering, and Co-Director of the Berkeley Sensor & Actuator Center (BSAC) at the University of California, Berkeley. She received her B.S. degree in Electrical Engineering from the Catholic University of America, Washington, D.C., and her M.S. and Ph.D. degrees in Applied Physics from the California Institute of Technology in Pasadena. Her research interest is in the surface and materials science and engineering of micro/nanosystems, with applications in health and environmental monitoring, harsh-environment sensing, energy technologies and sustainability. She is the recipient of several awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE) from the White House, NSF Young Investigator award, and the Beckman Young Investigator award. She is a Fellow of the American Vacuum Society (AVS) and the Institute of Electrical and Electronics Engineers (IEEE). She has served as editor to the American Chemical Society (ACS) Sensors and the IEEE Journal of Microelectromechanical Systems (JMEMS), and as associate editor to IEEE/SPIE Journal on Micro/Nanolithography, MEMS and MOEMS (JM3).

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