

Sensors at the Interface: Chemical and Biological Microsensors

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Abstract

It is a widely accepted axiom that interesting phenomena occur at interfaces. Optoelectronic and microelectronic semiconductor devices are often-cited examples of this maxim in electrical engineering. However, it is equally valid when applied more broadly to the interfaces between scientific and engineering disciplines. In this sense, microfabricated transducers for chemical and biological sensing—in short, chem/bio microsensors—embody the interesting, novel, and useful phenomena that appear at the interfaces between electrical and mechanical engineering and chemistry, biology, materials science, and physics. In this talk, I will review current trends in chem/bio microsensors, focusing on electrochemical, acoustic wave, optical, and cell-based sensing approaches. These techniques will be illustrated with microsensor projects underway at Sandia National Laboratories. The role of microfabrication in chem/bio microsensors will be highlighted in a discussion of microfluidic devices. Finally, microsensors' enabling role in handheld, portable chemical and biochemical detection systems such as Sandia's MicroChemLab, SnifferSTAR, and MicroHound, will be discussed.