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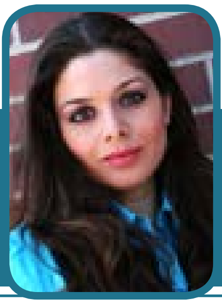

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Smelling through microfluidic olfaction technology

Detection of volatile organic compounds (VOCs) is of great importance in many applications involving either control of hazardous chemicals or noninvasive diagnosis. There are numerous methods for detection of VOCs where their efficacy is assessed by their sensitivity, selectivity, recovery time, and portability. Gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) are considered as "gold standards" for detection of VOCs. However, they are bulky, expensive, time consuming, and require highly skilled personnel for operation. Even the handheld GC detectors suffer from inability to detect small molecules, susceptibility to poisoning, and low sensitivity to highly oxygenated and sulfide-based gases. An alternative technique is electronic-noses (e-noses) that with a sensor array and pattern recognition methods mimic the mammalian olfactory system. Despite their real-time detection capability, the drift and need for recalibration of the sensor array for detecting different gases limit the broad use of e-noses. This paper presents a practical solution involving a single sensor for which the drift compensation and recalibration is much simpler than e-noses. To resolve the problem associated with lack of selectivity, a single metal oxide semiconductor (MOS) sensor is embedded into a microchannel coated with metallic and polymeric layers. The microchannel creates a unique "smell print" for a gas (or a gas mixture) due to diffusion and adsorption phenomena occurring while gas molecules move along the channel. The effect of ambient on the response along with different applications of the proposed microfluidic-based artificial olfaction system will be presented.

Biography

Mina Hoorfar received her PhD degrees in mechanical engineering from the University of Toronto in 2005. She is currently Director of the School of Engineering, The University of British Columbia, Canada. She held an NSERC Post-Doctoral Fellowship at Case Western Research University, where she was with one of the earliest centers of fuel cell research. Her current research focuses on the development of portable devices for biomedical applications and the design and fabrication of biosensors for environmental and agricultural applications.

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