TECHNOLOGY

Nanoengineered Chemical Sensors Offer Superior Detection of Environmental Pollutants, Hydrogen, and Other Industrial Chemicals

OVERVIEW

Detection of chemicals in air such as industrial pollutants, poisonous gases, chemical fumes, volatile organic compounds (VOCs), and trace explosives is vital for the health and safety of communities around the world; however, current methods of detection lack the sensitivity, selectivity, and cost benefits to be viable options. Techniques such as mass spectrometry and Raman/infrared-absorption based techniques are sensitive but require large technology footprints, trained operators, and lengthy processing times. Solid-state sensors such as chemiresistors and chemFETs can compete on cost but lack the sensitivity and selectivity of the laboratory techniques while consuming a fair amount of power, thereby limiting their use for most applications.

University of Maryland, in collaboration with the National Institute for Standards and Technology and George Mason University, have developed a novel chemical sensor architecture by combining the sensitive transduction capability of semiconducting nanostructures together with the enhanced catalytic efficiency of metal and metal-oxide nanoclusters. This new sensor technology can produce sensors whose selectivity can be precisely tuned to any small set of chemicals through the design of the nanocluster, something currently not possible with any other technology.

These new sensors offer the best of both worlds: the sensitivity and selectivity of the desktop laboratory systems (FTIR, MS/GC) while consuming significantly less power than current solid state devices. Furthermore, this new technology promises to achieve parts-per-trillion sensitivity, satisfying the need for low cost, on-demand trace explosives detection. These combined attributes promise to make a sensor technology that is unmatched in terms of sensitivity, selectivity, size, power, and cost.

Advantages:
• Parts-per-trillion sensitivity
• High selectivity
• Extremely low power consumption (• Sensors work at room temperature
• Long lifetime (50,000 hours)
• Small footprint. Can be made handheld.

Applications:
• Point-of-use chemical detection
• Indoor air monitoring
• Industrial monitoring
• Remote outdoor air monitoring
• Low cost, highly selective explosives detection

Status: Patent Pending

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Sensors/Monitors
- Chemical
- Nanotechnology + Nanoparticles + Nanomaterials

EXTERNAL RESOURCES

- US Patent 9,476,862

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