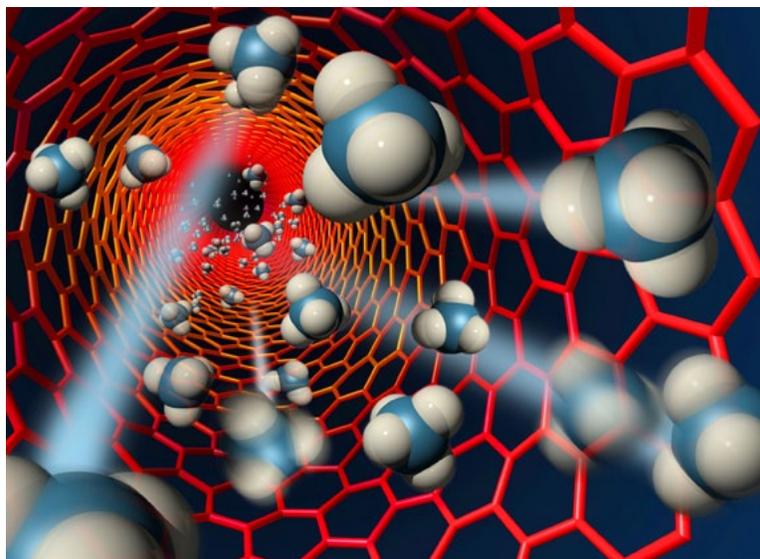




technology opportunity

Gas Composition Sensing using Carbon Nanotube Arrays

Lightweight Sensor Provides Measurements as Accurate as Conventional Methods



The sensor system can provide a high-sensitivity, low-power consumption tool that is very specific for identification of one or more gas components.

This innovation is a lightweight, small sensor for inert gases that consumes a relatively small amount of power and provides measurements that are as accurate as conventional approaches. The sensing approach is based on generating an electrical discharge and measuring the specific gas breakdown voltage associated with each gas present in a sample. An array of carbon nanotubes (CNTs) in a substrate is connected to a variable-pulse voltage source. The CNT tips are spaced appropriately from the second electrode maintained at a constant voltage. A sequence of voltage pulses is applied and a pulse discharge breakdown threshold voltage is estimated for one or more gas components, from an analysis of the current-voltage characteristics. Each estimated pulse discharge breakdown threshold voltage is compared with known threshold voltages for candidate gas components to estimate whether at least one candidate gas component is present in the gas. The procedure can be repeated at higher pulse voltages to estimate a pulse discharge breakdown threshold voltage for a second component present in the gas.

Benefits

- Lightweight
- Consumes a small amount of power
- Accurate
- Can be multiplexed to measure current from multiple CNT arrays

Applications

- Inert gas analysis tools
- Thermal conductivity sensors
- IR spectroscopy
- MS-based sensors

Technology in Detail

The CNTs in the gas sensor have a sharp (low radius of curvature) tip; they are preferably multiwall carbon nanotubes (MWCNTs) or carbon nanofibers (CNFs), to generate high-strength electrical fields adjacent to the tips for breakdown of the gas components with lower voltage application and generation of high current. The sensor system can provide a high-sensitivity, low-power consumption tool that is very specific for identification of one or more gas components. The sensor can be multiplexed to measure current from multiple CNT arrays for simultaneous detection of several gas components.

Patents

This technology has been patented (U.S. Patent 7,426,848).

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to inquire about licensing possibilities for this technology for commercial applications.

For More Information

If you would like more information about this technology, please contact:

**Technology Partnerships Office
NASA Ames Research Center
1-855-627-2249
ARC-TechTransfer@mail.nasa.gov**