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CHEMICAL PERCOLATION SWITCH

HARDWARE, CIRCUITS, & SENSORS

Gas detection device with high chemical sensitivity that operates at low power during latent operation.

TECHNOLOGY TYPE

Gas Sensors
Chromatography
Chemical Sensor

STAGE OF DEVELOPMENT

- Proof of concept established through initial testing.

- Prototype in development.

IP PROTECTION

U.S. Utility Patent and Continuation-in-Part Pending
Ultra-Low Power Digital Chemical Analyzers
US20180231514A1
US20170336378A1

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Reference Number: U-6038

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TECHNOLOGY SUMMARY

Chemical sensors and electronic noise technology require continuous sources of energy and lack the ability to operate at low power, which limits their distribution. Sensors with low power consumption, however, have poor chemical selectivity.

The proposed technology is a chemically selective percolation sensor that can operate with zero or near-zero power consumption. The sensor includes a positive and negative electrode separated by a nano-sized switch gap. A binding agent, which differs based on the target compound, binds to the switch to form an electrically conductive-selective pathway via percolation between the positive and negative electrode. The switch connects to the power supply and switches on when exposed to a programmable threshold concentration of the target compound. Such low-energy use improves device life, reduces risk of detection, and requires less battery maintenance, which is particularly applicable to military and defense applications. The switch can detect a wide range of chemical targets including chemical warfare agent aerosols and vapors, fuel and explosive vapors. For agricultural applications, the switch detects invasive parasitic plants.

FEATURES AND BENEFITS

- Operates at sub-10nW or nearly-zero power.
- Permits programmable threshold for customized readings.
- Increases device life.
- Reduces cost and increases portability.

RECENT PUBLICATIONS

Ghosh, C., Khan, S.H., Broadbent, S.J., Hsieh, H.C., Noh, S., Banerjee, A., Farhoudi, N., Mastrangelo, C.H., Looper, R., Kim, H. (2017). Nano-gap vapor sensor. *IEEE SENSORS*. 2017: 1-3. doi: 10.1109/ICSENS.2017.8234278

INVENTOR PROFILE

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