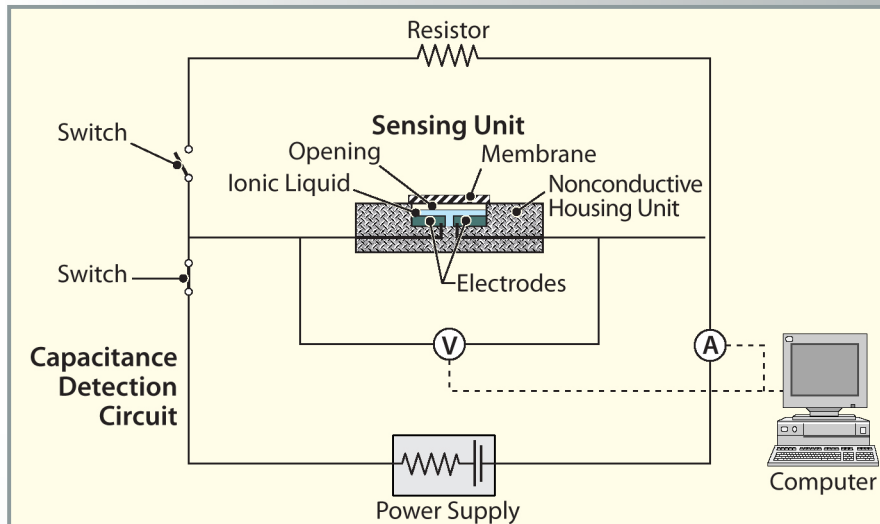


An Environmentally Safe Detector for Hazardous Gas

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Technology Summary

ORNL researchers developed a breakthrough design for a hazardous-gas detector that is environmentally safe and inexpensive and that includes both sensing and detecting means. The invention can detect and identify volatile organic and inorganic substances in vapors faster than conventional methods. Improved sensitivity using less complicated, less expensive measuring devices is another key feature of this invention.

The core of this invention is based on observations that when an ionic liquid is exposed to an environment containing a volatile substance, the ionic liquid dissolves some of the volatile substance. The substance then adsorbs on the surface of carbon electrodes and alters the energy of the electrochemical capacitor where the ionic liquid is the electrolyte.

Unlike dielectric capacitance-based gas detectors, this invention uses ionic liquids as the means of sensing. The use of ionic liquids permits a much higher energy storage capacity than those devices using polymers. The energy variances caused by the changes in ionic liquids' properties are generally larger than those caused using polymers. As a result, this invention can attain higher sensitivity using less complex and less costly measuring devices.

Advantages

- Environmentally friendly, by incorporating ionic liquids the use of pollutants is avoided
- Easily miniaturized, even to the degree that it can be mounted on a printed circuit board
- Improved sensitivity, largely due to greater capacitance variances
- Less expensive and a much simpler measuring device

Potential Applications

- Industry and research laboratories
- Field studies

Patent

Shannon M. Mahurin, Sheng Dai, and Josip Caja, *Method and Apparatus for Detection of Chemical Vapors*, U.S. Patent US 7,217,354, issued May 15, 2007.

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