Electronic nose prototype may be worn for safety-sniffing

May 12 2012, by Nancy Owano

(Phys.org) -- A UK company has developed an electronic nose that the company says can make a real difference, as a fast-acting device for detecting harmful substances in the environment. Peratech claims its electronic nose can pick up the presence of volatile organic compounds (VOCs) quickly and that its fast-acting sniffer has a large response signal (change in electric charge). The company also says its sensors have low power requirements that could be supplied by a small dedicated power source integrated into clothing.

The key differentiator in the Peratech nose comes from its materials. The sensor was developed using the company's Quantum Tunnelling Composite (QTC) material, which has attracted much interest among researchers in and outside the company. Peratech says its Quantun Tunnelling Composite is a class of electrically conductive material, and its technology was developed in conjunction with the University of Durham based on discoveries by the company founders. Peratech won this year's Queen's Award for Enterprise in the Innovation category for its QTC technology.

A University of Durham paper further defines QTC as a new type of metal-polymer; the materials change their resistance when a force is applied. In this case, the polymer content of the composite swells when exposed to VOCs. The material shows changes in electrical conductivity when mechanically deformed in any way (compressed, stretched, etc). "The reason for this unusual electrical behavior is thought to be due to a quantum-mechanical tunnelling process, whereby conduction electrons

tunnel from one metallic grain to another.“

The possibilities of the company’s device as a wearable sniffer may take the form of protective clothing for first responders who must carry out their work in areas that may be chemically contaminated. The prototype is also suggested as making its way into general clothing for people who need to monitor their health. Quantum Tunnelling Composites actually form an entire area of material science with a range of possible applications. The apps range from robotics to touch screens to consumer electrical products. David Lussey, Peratech's chief technology officer, considers its QTC technology as “a small tiger by the tail.” He said that there are many ways in which QTC could be put to use but the company is focusing on one thing at a time.

The electronic nose application was developed with the QTC research group at the University of Durham. Professor David Bloor, who has been part of the collaboration with Peratech, also considers Quantum Tunnelling Composite as unique in materials science. Referring to investigations of its properties by a team of researchers and students, he said “these never cease to amaze and open up different ways in which it can be used."

Peratech says it is looking for companies interested in licensing the technology from them to develop products.

More information: www.peratech.com/

via Technology Review, CNET