Nanosensors on the alert for terrorist threats
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"Choosing the right sensor composition can make a device at least 10 times more effective and enable an exceptionally fast response, which is crucial for preventing terrorist attacks," says Prof. Leonid Trakhtenberg of the Department of Molecular and Chemical Physics at MIPT, who is the leader of the research team and the head of the Laboratory of Functional Nanocomposites at ICP RAS.

According to the research findings, the most promising detection systems are binary metal oxide sensors, in which one component provides a high density of conductive electrons and another is a strong catalyst.

A mixed system of that kind has the two necessary components for effective gas detection, viz., an electron donor and a substance "accommodating" the reaction. An additional factor contributing to faster sensor response is the formation of chemisorption centers, i.e., the chemically active spots on the nanocrystals that facilitate gas molecule adsorption.

"We are planning further research into the possibilities for sensor design presented by the multicomponent metal oxide nanocomposites incorporating nanofibers. The development of new effective sensor compositions will be based on a reasonably balanced approach involving both the experimental tests and the advancement of our theoretical understanding of the sensing mechanisms," says Prof. Trakhtenberg.

A promising approach to the development of new gas detection systems is the use of "core-shell type" composite metal oxide nanofibers, in which the "core" and the "shell" are composed of two different oxides.

More information: G.N. Gerasimov et al, The mechanisms of sensory phenomena in binary metal-oxide nanocomposites, Sensors and Actuators B:

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