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Detecting dangerous chemicals using nanosensors

(*Nanowerk News*) A consortium of European and Russian scientists has developed a new generation of ultra-sensitive sensors for the detection of toxic chemicals. Since some of these chemicals are so dangerous, it is vital to know their concentration in the air, especially in industrial and populated areas.

Benzene, toluene and xylene (BTX) are important petrochemical compounds that are widely used in industry. However, measurement of these toxic gases in complex mixtures usually requires expensive laboratory equipment that severely limits preventive measures in a working environment.

The 'Innovative nanostructured optochemical sensors' (INGENIOUS) project, funded by the EU, was established to improve on the current and conventional detection techniques. Its aim was the development, evaluation and validation of novel ultra-sensitive and selective nano-structured optochemical sensors for the detection of BTX chemicals.

INGENIOUS project work involved several cutting-edge technologies, such as sensing materials based on nanoporous and hybrid polymer membranes, and on nanoparticles. The project demonstrated that polymer nanoparticles were less promising for this type of application than those based on silica.

To enhance the optical response of the sensing nanoparticles, the project team synthesised new classes containing metal cores. In addition, optimisation of the sensing layers led to the development of a polymer membrane that is easily scaled up and industrialised.

For future reference, the technology developed in the completed INGENIOUS project could enable the realisation of a compact device that can be used to monitor mixtures of BTX chemicals in real time. The relative simplicity and low cost of the system will enable its widespread use and improve the safety of those workers exposed to BTX chemicals in the EU's petrochemical industry.

Source: *Cordis*