# ACTIVE SENSOR STRUCTURES WITH SURFACE ACOUSTIC WAVES FOR CHEMICAL WARFARE AGENT SIMULANT (DMMP) DETECTION

Wiesław Jakubik

*Institute of Physics CSE, Silesian University of Technology, ul. S. Konarskiego 22B, 44-100 Gliwice, Poland*

The idea of "Active Sensor Structures" (ASS) in the field of gas detectors with Surface Acoustic Waves (SAW), where the activation relies on a suitable light illumination of the sensor surface, will be presented. Due to such an activation, we can expect an enhanced interaction between detected molecules and sensor structure, especially in the case of photoconductive materials, even at low temperatures. Besides, for a given gas concentration, the expected response and recovery times should be shorter, because of the increased molecular interactions - very important from the practical point of view of the detection of toxic gases. The main goal of ASS in SAW devices is to improve the sensor sensitivity by increasing the so called acoustoelectric interactions, especially at low temperatures ($<100^0$C), by means of a light excitation. This concept will be shown for detection of trace amounts of chemical warfare agents simulant, i.e. the dimethyl methylphosphate (DMMP) that is non-toxic organophorus compound with a similar structure to sarin.

The use of photoconductive regioregular poly(3-hexyltiophene) polymer (RR-P3HT) films as a potential material for the DMMP detection will be reported. The Surface Acoustic Wave (SAW) and electrical resistance responses to low DMMP vapour concentrations (1-3 ppm in air) of RR-P3HT film deposited on the sensor module by means of spray coating method will be presented. Studied material was activated by light emitting diodes with different wavelengths. Results demonstrated that sensing properties of RR-P3HT polymer films towards DMMP can be significantly enhanced with blue and yellow LED light activation.