Research project description

MULTISENSING PLATFORM FOR WARFARE AGENT DETECTION

Project Directors:

SURNAME/First name/Title	Job Title, Institute and Address	Country
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Alexander Mozalev/Dr	BUT-BRNO, Czech Republic	Czech Republic
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Objectives: There is a growing awareness that the presence of chemical warfare agents (CWAs) in the air can pose a major threat in public civilian spaces. Although ion mobility spectrometry (IMS) is a technological breakthrough that is becoming a reference method for trace gas analysis, in the particular case of CWA detection, this technique still necessitates to be coupled with other bulky and expensive instrumental methods, such as gas chromatography/mass spectrometry (GC/MS), to minimize the occurrence of false positives. In this context, our research envisaged within this project will address these problems by developing new technology. New sensors will be developed employing nanostructured metal oxide active films with huge surface areas, which will significantly increase the interaction ratio between the active films and target species, increasing thereby the sensitivity of the sensor itself. The surface of CNT active films will be functionalised utilizing cold reactive plasmas in such a way that the functional groups will be grafted to their surface. As a result, the selectivity of these devices towards organophosphorous compounds will be enhanced. The gas sensors integrating the array will be multi-parameter: D.C. resistance, A.C. impedance, photoluminescence, and response to temperature modulation. A pre-concentrator unit will be also integrated to improve (i.e., lower) the limit of detection of our proposed sensory system bundle.

Ph.D student and Post-doc:

- Imen Hafaid, , Researcher, Material science, Tunisia
- Atef Thamri, Ph.D student, Electronics, Tunisia
- Hamdi Baccar, Researcher, Physist, Tunisia

Results:

1/Alexander Vergara,Raul Calavia, Rosa María Vázquez, Alexander Mozalev, Adnane Abdelghani, Ramón Huerta, Evor H. Hines, and Eduard Llobet, Multifrequency Interrogation of Nanostructured Gas Sensor Arrays: A Tool for Analyzing Response Kinetics, Analytical Chemistry, 84, (2012), pp.7502-7510.

2/P. Clement, I. Hafaiedh, E.J. Parra , A. Thamri , J. Guillot , A. Abdelghani ,E. Llobet, Iron oxide and oxygen plasma functionalized multi-walled carbon nanotubes for the discrimination of volatile organic compounds, Carbon 7 8 (2 0 1 4) 5 1 0 –5 2 0

3/ Atef Thamri, Hamdi Baccar, Pierrick Clément, Eduard Llobet, Adnane Abdelghani Rhodium decorated MWCNTs for detecting organic vapors, International Journal of nanoatechnology, Vol.12, N° 8/9, (2015), 562-571.

4/ Hamdi Baccar, Atef Thamri, Pierrick Clément, Eduard Llobet and Adnane Abdelghani, Pt- and Pd-decorated MWCNTs for vapour and gas detection at room temperature, Beilstein Journal of Nanotechnology, vol.6, (2015), 919-927.

Budget

	(1)	(2)	(3)	(4)
Country:	**Tunisia**	Spain	USA	USA
Institute:	**INSAT**	URV	BRNO	Bio-Circuits Institute.