

Heterogeneous sensors, the tool for the Digitalization of the safety and security sectors. A vision and uses cases.

Nieves Murillo

TECNALIA, Mikeletegi 7, Donostia-San Sebastian

nieves.murillo@tecnalia.com

Digitalization and internet of Things, IoT, is a revolution affecting all industrial sectors, covering from process, products, raw materials and the operations involved. The need of information by IoT and the high level of acceptance of the digitalization process by the markets and industrial actors are having a catalytic effect on the development of new sensors and of new concept proposition for the monitoring of a wide range of application, going from industrial process or product to our infrastructures or our health during our working activities or during our leisure one. Both factors lead to the need of an increment of the number of sensors with different capabilities and functionalities that they should be combined for the monitorization of an industrial process or a specific area. Such combination of sensors with different capabilities, such as processing, computation and energy requirements, and functionalities, pressure, temperature, stress, strain, chemical substances, gas, etc. is called Heterogeneous sensors. In this scenario, we should mention that the global market for smart sensors will grow at an annual rate of 19% and it is expected to reach \$ 60 billion in 2022. Allowing to bring in the submicrometer sensors into the final applications, and therefore to the market, and allowing to bring in the submicrosensors consolidation in the sensors market. If we look into the nanotechnologies and the nanomaterials with a broad vision, covering from the submicrometric sensors to the few nanometer, we start to find commercial sensors application available into market and it is hope that new ones come in the next years.

In this work, we will review piezoresistive sensors submicrometric to the stress and strain monitoring in machine tools, as well as, the chemical detection of gaseous substances by conductimetric principles [1, 2]. Or, the development of new optical principles for the identification of chemical or biological threats with new nanostructured layers [3]. Without forgetting the need of new energy sources [4] for the heterogeneous sensors to the development of autonomous nodes based on energy harvesting principles.

References

- [1] Ruiz, V., Pérez-Marquez, A., Maudes, J., Grande, H.-J., Murillo, N., Sensors and Actuators, B: Chemical, 262 (1) (2018) 902-912.
- [2] Alicia De San Luis, Ziortza Aguirreurreta, Leticia M. Pardo, Ana Perez-Marquez, Jon Maudes, Nieves Murillo, María Paulis, Jose Ramon Leiza, Israel Journal of Chemistry (in press).
- [3] S. Ponce-Alcántara, D. Martín-Sánchez, A. Pérez-Márquez, J. Maudes, N. Murillo, J. García-Rupérez, Optical Materials Express, 8 (10) (2018) pp. 3163-3175.
- [4] N. Murillo, J. Maudes, A. Perez-Marquez, J. Ortiz, G. Aranguren, 8th European Workshop on Structural Health Monitoring (2016), EWSHM 2016.

Figures

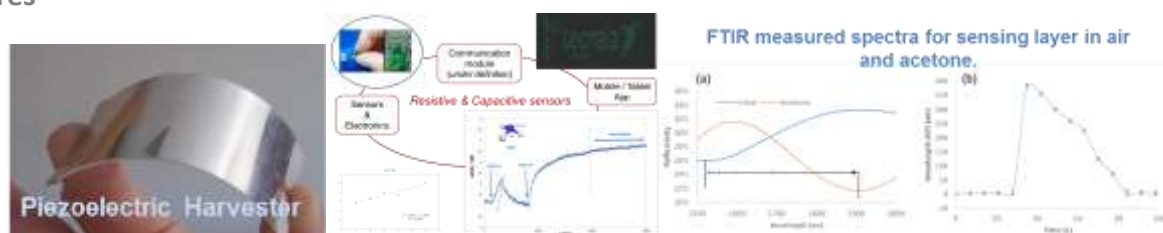


Figure 1: Examples of heterogeneous smart sensors.