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SESSION 1: *Advanced materials for sensing technologies*

INVITED presentation

Human Volatilome: a new challenge for gas sensors

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The analysis of Volatile Organic Compounds (VOC) from body fluids or Volatilomics is an emerging sector, that may have a key role in discovering VOC biomarker patterns of relevance for the assessment of risk for human health.

The path of environmental VOCs in the human body is a complex process of mixing, diffusion and distribution between blood, adipose tissues and other physiological fluids, as well as of metabolic activities. The rate and degree of elimination of environmental VOCs from the body depend on the concentration of the compound, the duration of exposure, the solubility in blood and lipid tissues and the individual physiology. All biological samples (blood, exhaled, urine, saliva, feces, seminal fluid, etc.) have in their composition a volatile fraction consisting of exogenous VOCs deriving from external factors (environment, lifestyle, diet, microbiome, drugs) and from endogenous VOCs due to internal factors (human metabolic activities) in the organism.

The analysis of human Volatilome has, hence, a dual application potential: a) human biomonitoring In Exposomic studies for assessing population-wide exposure to hazardous chemicals with a particular interest in population living in contaminated areas; b) disease screening, diagnosing and monitoring for clinical uses.

While GC/MS remains the gold standard in identifying VOC patterns that can serve as diagnostic biomarkers of specific diseases or environmental exposure, other simpler, portable and relatively inexpensive diagnostic tools, such as gas/VOC sensors as well as devices as the electronic noses can be used for such applications.

Both research areas of Exposome and Diagnostics stimulate more comprehension in health risk assessment and disease mechanisms and offers a new and exciting challenge for Sensors field. An introduction to these new topics and a survey of gas sensors application examples will be given.

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[2] G. M. Buck Louis et al. Curr Environ Health Rep. 4(1) (2017) 89–98

[3] M. Valente Farraia et al. Porto Biomed. J. (2019) 4:4(e42)

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