

Department of Physics

Research on breath analysis

Research Unit / Team



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Objectives

- ❑ Simultaneous detection and quantification of Volatile Organic Compounds (VOCs) from Alveolar Air;
- ❑ Developing of new technology for breath analysis and its clinical applications for diagnosis and monitoring of several diseases;
- ❑ Innovative methods for **online non-invasive study of drug decomposition and pharmacokinetics** of volatile metabolites in trace concentrations

Methodology

The new generation of instruments such as Ion Mobility Spectrometer (IMS) is used. The IMS evolved into an inexpensive and powerful analytical technique for sensitive detection of a large number of chemical compounds.

- ❑ IMS offers a **tenfold higher detection** rate of VOCs (low *ppb* or *ppt* range)
- ❑ multicapillary column (MCC) as a pre-separation unit → an immediate **twofold separation** of VOCs with visualization in a **3D IMS chromatogram**

The fact that it does not require vacuum or further sample preparation and the analysis is performed in a few minutes makes this technique suitable to be used in hospitals and healthcare centers.

Expected Results

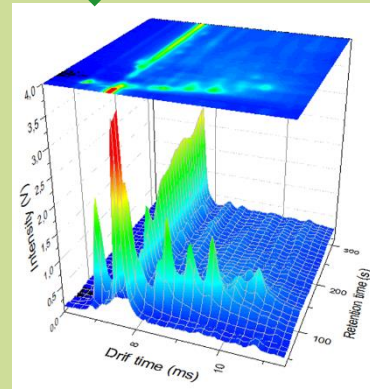
- ❑ New sensor for real time monitoring of the breathing cycle and automatic acquisition of samples from alveolar air.
- ❑ New method for diagnosis from the alveolar breath: harmless, quicker and cheaper than the conventional analysis;
- ❑ Fingerprint of Endogenous Volatile Metabolites as a new biomarkers for early detection and monitoring of Kidney Disease, Diabetes and Cancer.



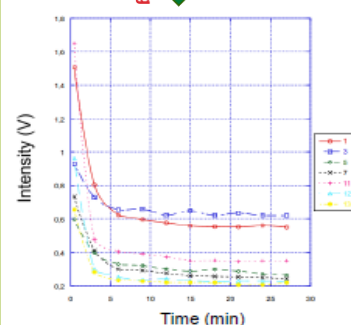
VOC's in breath



Collection of the alveolar air



Processing
Data



Exponential decay of nicotine (peak 1) and other VOCs after smoking a conventional cigarette