EDITORIAL

Special section on Breath Gas Analysis

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Special section on Breath Gas Analysis

Guest Editors

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In Spring 2009 an idea was born to bring together the leading specialists from Germany and Austria working in the emerging field of breath gas research and its application for clinical diagnosis and therapeutic monitoring within an internationally open workshop. To bring this idea to fruition the first German–Austrian Workshop on Breath Gas Analysis was held in Greifswald, Germany, 7–9 June 2010. The conference was organized by the Leibniz Institute for Plasma Research and Technology (INP), Greifswald, in cooperation with the Institute of Community Medicine (ICM) of the University of Greifswald. The scientific program of the workshop covered all modern aspects of exhaled breath gas analysis ranging from sampling techniques and analytical approaches to pilot cases studies. The 54 participants came from nine European and non-European countries. The five invited speakers originated from Germany, Austria, Great Britain and the USA.

The workshop showed that over the few last years analytical methods for the detection of volatile compounds released through exhaled breath, the nasal cavity, oral cavity, urine or sweat and the determination of their concentrations, have been considerably improved or even newly developed. Most of these methods, used today, were the focus of the workshop including:

- gas-chromatography with mass spectrometric detection (GC-MS), often combined with thermal desorption (TD-GC-MS)
- proton-transfer-reaction mass spectrometry (PTR-MS)
- laser absorption spectroscopy (LAS)
- ion mobility spectrometry (IMS), mostly coupled to multi-capillary columns (MCC/IMS)
- differential ion mobility spectrometry (DMS)
- sensors or sensor arrays

We would like to mention some highlights of the workshop, which are (in part) now published as a special section in this issue.

One of the first marketable methods of breath analysis based on LAS was introduced with the flow-through fast liver investigation packet (FLIP) to quantitatively measure the amount of exhaled $^{13}$CO$_2$ (see the paper by T Rubin et al [1]).

Differential ion mobility spectrometry (DMS), a further development of conventional IMS using strong oscillating electric fields perpendicular to the flow of carrier gas and ions, was adopted for VOC analysis in exhaled breath and headspace of feces (see the paper by R Purkhart et al [2]).

A new sensor to measure the asthma marker NO was presented (see the paper by E Magori et al [3]). The sensor is based on the conversion of NO into NO$_2$ followed by a NO$_2$ work function gas sensing. Furthermore a nano-medical artificial olfactory system (AOS) for cancer detection that is based on an array of cross-reactive sensors of nanoparticles and/or single-walled carbon nanotubes for detecting volatile biomarkers of cancer was introduced.

Clinical studies were mostly directed to lung cancer verification using VOC detection in exhaled breath. Also, rapid diagnosis in nephrology was reported. TD-GC-MS, PTR-MS, MCC/IMS or electronic noses (arrays of chemo sensors) were used. Sometimes the methods of pattern recognition were taken into account.
A number of low-molecular breath gas constituents using LAS have been monitored (see the paper by M Hannemann et al [4]). These investigations were included in the population-based epidemiological Study of Health in Pomerania (SHIP-TREND) performed at the University of Greifswald. SHIP-TREND covers about 5000 adult subjects, aged 20–79 years, within three years.

Finally, we would like to give our special thanks to the Scientific Advisory Board and to the Local Organizing Committee for their important contributions to the success of the workshop. We are also particularly grateful to the Editorial Board of the Journal of Breath Research for peer-reviewing the submitted articles and for the publication of this special issue.

References

[1] Rubin T, von Haimberger T, Helmke A and Heyne K 2011 Quantitative determination of metabolization dynamics by a real time $^{13}$CO$_2$ breath test J. Breath Res. 5 027102