Title: Development of selective micro-gas sensors using solid nanoporous adsorbents.

Place: Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon and Institut Femto-ST, Besançon, France.

Financial support: DECOLAIR project supported by l'Ecole Universitaire de Recherche EIPHI, by the Région Bourgogne Franche-Comté and by FEDER (gross monthly salary: around 3 000 € depending on the experience).

Research project: Ambient air quality within buildings is considered as a major public health concern. In order to limit the presence of Volatile Organic Compounds (VOCs) in indoor air, the most widely used purification method is based on the capture of these compounds on filters essentially made of activated carbon. Once saturated, adsorbents are generally burned with the VOCs and replaced by new materials in the air treatment unit.

Most of time, these air filtration units are not equipped with detection systems able to control first, if the treated air is effectively well purified and second, if it is necessary to regenerate the adsorbent. Then, in order to control the treatment efficiency (in terms of depollution and/or regeneration), it appears necessary to develop micro-gas sensors, which can easily be integrated in the unit. These sensors should be able to evaluate the efficiency of air treatment over the time.

In this context, this post-doctoral position aims at developing and extensively characterizing innovative devices for identifying various VOCs in indoor air. These devices are intended to be miniaturized, integrated in treatment units and able to identify VOCs during a continuous analysis cycle lasting a few minutes. To achieve this, various sensor technologies will be studied:

- Semiconductor-based gas sensors,
- Surface acoustic wave gas sensors,
- Microwave-based gas sensors.

The original aspect of this study is to used numerous adsorbents as active materials in gas sensors to identify and, if possible, quantify VOCs in indoor air. Zeolites, functionalized mesoporous silica or Metal Organic Frameworks (MOFs) are the porous solid materials which will be studied during this postdoc. The success of this interdisciplinary project is largely based on the identification of efficient nanoporous materials allowing the reversible adsorption of specific chemical compounds and also on the ability of the device to detect them selectively.

Scientific surrounding: The postdoc will integrate dynamic research teams created around the DECOLAIR project and aiming at studying the reactivity of porous solids as VOCs preconcentrators. This project will be developed in "**INTERFACES" Department of ICB** under the supervision of Pr. Jean Pierre Bellat. Close collaborations will also carry on with the "*Micro Nano Sciences & Systems"* **and "***The Time & Frequency"* **Departments of Femto-ST under the supervision of Dr. Jean Baptiste Sanchez.**

Research background: The candidate should be an experimentalist with a strong expertise in physical chemistry and, if possible in chemical gas sensors. The candidate should also be attracted by the pluridisciplinar aspect of this project. Specific knowledge of porous materials and/or micro-technology is not essential but would be appreciated. Funding is for one year.

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