



MIGRATE-WS2016-16

A MICRO PHOTO IONIZATION DETECTOR FOR VOC GASES

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The development of ultra-portable, accurate and powerful analytical tools capable of monitoring the air pollutants in near real time is a major technical challenge. Among pollutants, Volatile Organic Compounds (VOCs) such as Benzene are of major concern for indoor air quality due to its ubiquity and carcinogenic effect. ICPEES and INR have jointly developed a miniaturized GC/PID system dedicated to BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) monitoring in near-real time conditions at ppb level. This system has a temporal resolution of 10 min, a detection limit of 0.5 ppb.

The objective of this project is to improve this system by incorporating the Photo Ionization Detection into a microfluidic μ -PID device, focusing on the time to replenish the sample volume. The work will initially define and quantify the existing design, and identify the current design bottlenecks. An iterative campaign of test / evaluation of preliminary design concepts will be conducted resulting in a redesigned microfluidic based PID inlet / outlet. The finalised design will be fabricated and tested, and ultimately integrated into the BTEX micro-analyser. The instrument will be evaluated in terms of limits of detection, repeatability and reproducibility using controlled gaseous BTEX concentrations. Indoor field campaigns will be performed to assess the accuracy of the new micro-device and to compare its measurements with other reference methods.