Laboratory: Institut Pascal (UMR6602 UCA/CNRS) - Group PHOTON/Minamat, Chemical MicroSensors and sensor-system
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Studies of the potentialities of nano-functionnalized matrix as sensing layer of microsensors dedicated to hydrogen leakage monitoring (H2)

To ensure the continuous monitoring of hydrogen leakage risk on storage sites as well as during transport operations, this work aims to the development of efficient and low dimension gas microsensors exhibiting low thresholds of detection, high selectivity and operating conditions in agreement with ATEX regulations. The scientific approach consists in the development of hybrids materials or heterostructures implementing functionalized nanomaterials as sensing element. Materials exhibiting high specific surface areas (graphene, nanocarbons, polymers) will be decorated by functional groups with specific reactivity with hydrogen (macrocyles, metallic nanodots or nanofilms) and associated to conductimetric, acoustic or plasmonic transducers. By means of the technological platforms available into the host group (thin films realization platform, electrical and physico-chemical characterizations techniques, ad-hoc test benches for gas measurement and sensor calibration), the PhD student will have to reach optimized sensing performances. This could be obtained by the relevant selection of the best coupling material/transducer as well as by the implementation of specific measurement methods and/or technological bricks (filtering membranes, preconcentration, signal treatment unit).