Fabrication of hierarchical metal oxide/metal organic framework morphology for chemiresistive gas sensing application

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Breath analysis is a recent non-invasive technique developed for the detection of different volatile organic compounds (VOCs)[1], which are indicators for various diseases. In this work, we present a novel metal oxide/metal organic framework dual layer morphology for enhanced VOC detection. Fabrication of the dual layer was carried out using two principle methodologies: flame spray pyrolysis (FSP) and chemical vapour conversion (CVC). FSP is a technique employed to synthesize metal oxide films from volatile metal precursors that are decomposed or oxidized in hydrogen-oxygen flames to form nano-oxide layers[2]. CVC is employed to convert the top metal oxide layer to metal organic framework (MOF) using the appropriate organic linker[3]. Configured as a highly selective sensor, the sensing interface exhibits synergistic effect of the metal oxide layer and MOF as it combines the highly sensitive property of the metal oxide layer along with the filtering capabilities of the porous material, in order to be able to selectivity detect the gas of concern. The developed sensor demonstrates a wide linear range, a detection limit of 0.1 ppm and good selectivity when comparing common VOCs.

References

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