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Functional Poly(Hedral Oligomeric Silsesquioxane) Nano-Spacer to Boost Quantum Resistive Vapour Sensors' Sensitivity and Selectivity

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Abstract : The analysis of the volatolome emitted by the human body with a sensor array (e-nose) is a method for clinical applications full of promises to make an olfactive fingerprint characteristic of people's health state. But the amount of volatile organic compounds (VOC) to detect, being in the range of parts per billion (ppb), and their diversity (several hundred) justifies developing ever more sensitive and selective vapor sensors to improve the discrimination ability of the e-nose, is still of interest. Quantum resistive vapour sensors (vQRS) made with nanostructured conductive polymer nanocomposite transducers have shown a great versatility in both their fabrication and operation to detect volatiles of interest such as cancer biomarkers. However, it has been shown that their chemo-resistive response was highly dependent on the quality of the inter-particular junctions in the percolated architecture. The present work investigates the effectiveness of poly(hedral oligomeric silsesquioxane) acting as a nanospacer to amplify the disconnectability of the conducting network and thus maximize the vQRS's sensitivity to VOC.

Keywords : volatolome, quantum resistive vapour sensor, nanostructured conductive polymer nanocomposites, olfactive diagnosis
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