

Functionalized multiwall Carbon nanotubes for gas sensing

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The monitoring of the environment requires devices that must be fast, sensitive, stable and selective to detect the pollutants and toxic gases/ vapors in a simple and efficient way. The chemical modification of multiwalled carbon nanotubes (MWCNTs) with a long chain mercapto-acid is reported to improve the sensitivity and the response time of gas sensors for detecting alcohols, acetone and toxic gases such as DMMP and DMF. We developed sensors employing MWCNTs decorated with gold nanoparticles and modified with 16-mercaptohexadecanoic acid (MHDA) monolayer. Morphological and compositional analysis by Transmission Electron Microscopy (TEM), Fourier Transform Infra-red Spectroscopy (FTIR) and X-ray photoelectron spectroscopy were performed to characterize the gold nanoparticles and to check the bonding of the thiol monolayer. The detection of aromatic and non-aromatic volatiles and DMMP and DMF vapors by MWCNT/Au and MWCNT/Au/MHDA shows that the presence of the self-assembled layer increases sensitivity, selectivity and ameliorates response dynamics of the sensors.

Biography:

Prof. Dr. A. Abdelghani is a Full Professor at the National Institute of Applied Science and Technology (INSAT, Tunisia). He obtained the Habilitation in Physics in Tunisia (faculty of Science of Tunis) in 2004 and a Habilitation (worldwide recognition for conducting and leading research) in "Sciences pour l'Ingénieur" in 2009 at the Ecole Normale Supérieure de Cachan (France). He is now the leader and principal investigator of a research group working mainly on gas sensors based on functionalized carbon nanotubes (metallic oxides, nanowires, nanoneedles, polymers) and on the development of interdigitated gold microelectrodes integrated in microfluidic cell for bacteria analysis in biologic medium. He published more than 90 papers in International Journals (H-index 25, December 2016) and supervised more than 12 Ph.D theses and 30 master's student. He is deeply involved in industrial applications in his field of research with implications for the design and the development of affordable and cost-effective sensing devices for diagnostics and theranostics which will have an effective impact in the developing countries. He received the Tunisian President Award of the "best scientific researcher" in Tunisia in 22 July 2015.