

Synthesis and characterization of conductive polymer composite based on polypyrrole and surface treated graphene: Application to chemical sensing of nitrogen oxides.

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Abstract:

The main objective of this work is to carry out the chemical synthesis and the characterization of conducting polymers composite based on polypyrrol combined with pristine and surface-treated graphene, through the elaboration of different samples namely *PPy / GNP*, *PPy / GO* and *PPy / GO-OH*, in order to be used as sensitive elements in a homemade chemiresistive module, for an on-line detection of nitrogen oxides vapors. All the necessary steps for the realization of the chemiresistive module, ranging from the elaboration, characterization and performance evaluation were studied.

The sensitive elements based on the prepared composite was subjected to several structural and morphological characterizations, particularly by *FTIR*, which has allowed the identification of the elongation vibrations and deformations of functional groups in *PPy* and in its composite with graphene. Moreover, Raman spectroscopy has also confirmed the structure of *PPY-Graphene*, while *XRD* analysis has indicated the dispersion quality of the *PPy* in the both graphene matrixes, and it has revealed their clear effect on the crystalline properties of composites. After performing several target gas injections (*NO*, *NO₂*) in static and dynamic mode, all parameters related to the selectivity, sensitivity, limit of detection and the response time, were determined at ambient temperature.

Keywords: Conducting polymers; surface treated graphene; polypyrrol, Nitrogen oxide sensing.