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Methanol sensing materials fabricated from graphene based materials/polyindole composites

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Abstract

Preparation of graphene based materials/polyindole composites by in situ polymerization for using as a methanol sensor was presented. The graphene based materials consisted of the commercial graphene (cm-G), the commercial graphene oxide (cm-GO), the synthesized graphene oxide (OIHM-GO), the reduced graphene oxides (rGO) by thermal reduction at 120 °C (T-rGO) and chemical reduction by ascorbic acid or vitamin C (C-rGO). The characterizations of chemical structure, element content, bonding, morphology and electrical conductivity were reported. Herein, the sensing responses were investigated from the electrical conductivity change at room temperature under N2 base gas. The methanol response efficiency depended the amount of oxygen species acting as the active sites and inducing the diffusion ability of methanol into the inner layer of material. Therefore, the relative electrical conductivity response of the in situ cm-GO/dPIn to methanol was relatively higher than those of the in situ OIHM-GO/dPIn, the in situ C-rGO/dPIn, the in situ T-rGO/dPIn, and the in situ cm-G/dPIn, respectively. For the in situ OIHM-GO/dPIn, it possessed the high relative conductivity response of 81.89 ± 2.12, the sensitivity of 7.37 ppm-1 with the R2 of 0.9967 in the methanol concentration range from 1.14 - 11.36 ppm, the theoretical LOD of 0.015 ppm, the repeatability of at least 4 cycles with good selectivity. This work presented the first report in the preparation and testing of the graphene based materials/polyindole composites as a methanol sensor.

Biography

Phasuksom K completed her B.Sc. with a Second Class Honour in Industrial Chemistry from King Mongkut's University of Technology North Bangkok (KMUTNB), Thailand in 2010 and her M.S. in Material Science from KMUTNB in 2013. She received a PhD scholarship from the Royal Golden Jubilee Ph.D Program of the Thailand Research Fund in 2015 and now is studying in the Polymer Science at the Petroleum and Petrochemical College, Chulalongkorn University. Her interesting areas are conductive polymer, polymer synthesis, pH sensor, gas sensor, and polymer coating.

Publications

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