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Methanol sensing material based on conductive polyindole

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Polyindole (PIn) was applied as methanol sensing material in this work. The electrical conductivity change of PIn was monitored at room temperature. The electrical responses of PIn under various vapors from non-polar, low polar, and high polar solvents were also investigated; the highest relative responses of conductivity were observed when exposed to vapors from high polar solvents, especially methanol possessing the highest dielectric constant and hydrogen bonding interaction compared to other vapors inducing the highest interaction to PIn. The discrimination analysis of sensor was evaluated by the principal component analysis (PCA), it was demonstrated that the sensor possessed the good discrimination efficiency towards high polar vapors. Moreover, the sensor response depended on the doping mole ratio, the dPIn/$FeCl_3$ with the doping mole ratio of 10:1 provided the highest relative response of conductivity of 57.83 at the low concentration of 11.36 ppm, which nitrogen was used as a base gas. The sensitivity to methanol vapor obtained from the calibration curve in the methanol concentration range of 1.14-11.36 ppm was 5.27 ppm^{-1} with the correlation coefficient (R2) of 0.9965, and the theoritical limit of detection was as low as 0.048 ppm. The sensor based on the dPIn/$FeCl_3$ 10:1 reported here is a good candidate for use as a methanol sensing material.

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