

Ethylenediamine organic chemical detection by field-effect transistor sensors fabricated with Bismuth-Vanadium Oxide-Tungsten Oxide ($\text{Bi}(\text{V}_2\text{O}_4)\text{-WO}_2$) nanosheets

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This work reports the preparation of bismuth-vanadium oxide-tungsten oxide $\text{Bi}(\text{V}_2\text{O}_4)\text{-WO}_2$ nanosheets (NSs) via hydrothermal method at low temperature and utilized as the electrochemical electrode for fabricating field-effect transistor (FETs) based sensor. Synthesized $\text{Bi}(\text{V}_2\text{O}_4)\text{-WO}_2$ displayed defined and thin sheet like morphology with the average thickness of ~ 35 nm. The synthesized $\text{Bi}(\text{V}_2\text{O}_4)\text{-WO}_2$ NSs fabricated FET sensor was benefited by the large surface area, resulted in the fast detection of ethylenediamine chemical at very low concentration. The sensing results displayed a reproducible sensitivity of $\sim 13.27 \text{ mA}\mu\text{M}^{-1}\text{cm}^{-2}$, detection limit of $\sim 72.15 \text{ nM}$ with the correlation coefficient (R) of ~ 0.99644 and good linearity from 10 μM to 100 μM . The fabricated $\text{Bi}(\text{V}_2\text{O}_4)\text{-WO}_2$ NSs FETs sensor exhibited reproducible and excellent stability of sensing performance and thus, confirmed it as useful tool for water maintaining system.