Promising chemical sensors using tungsten oxide-bismuth vanadium oxide (WO3-BiVO4) as electrode material for 3-methoxypropionitrile (3-MPN) detection

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This work demonstrates a simple and effective hydrothermal synthesis of tungsten oxide-bismuth vanadium oxide (WO_3-$BiVO_4$) which were effectively applied as electrode for the detection of 3-methoxypropionitrile (3-MPN). The morphological observations revealed that the synthesized nanomaterial was comprised of stacked layered nanoplates (LNPs) WO_3-$BiVO_4$ with the average diameter of 50-60 nm. The structural and crystalline results revealed the existence of WO_3 and $BiVO_4$ crystals, confirming the formation of WO_3-$BiVO_4$ LNPs. Electrochemical studies suggested a rapid sensing response towards 3-methoxypropionitrile (3-MPN) chemical through high electrocatalytic activity over the surface of WO_3-$BiVO_4$ LNPs modified electrode. The fabricated 3-methoxypropionitrile (3-MPN) chemical sensor based on WO_3-$BiVO_4$ LNPs exhibited a high and reproducible sensitivity of ~605 $\mu A \mu M^{-1} cm^{-2}$ with excellent linear dynamic range (LDR) and correlation efficient of R = ~0.99502.