

## Ag Functionalized Molybdenum Disulfide Hybrid Nanostructures for Selective and Sensitive Amperometric Hydrogen Peroxide Detection

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Ag nanoparticles functionalized flower-like molybdenum disulfide (MoS<sub>2</sub>) hybrid nanostructures (AgNPs/MoS<sub>2</sub>) were successfully synthesized by a facile hydrothermal method. The structure and surface morphology were subsequently characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS) techniques. The as-synthesized AgNPs/MoS<sub>2</sub> hybrid nanostructures were modified on a glassy carbon electrode (GCE) and further utilized for amperometric hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) detection. The electrochemical behaviors and sensing performance of the AgNPs/MoS<sub>2</sub>/GCE were studied by cyclic voltammetry (CV) and single-potential amperometry methods. The obtained results have demonstrated that the developed AgNPs/MoS<sub>2</sub>/GCE amperometric sensor possesses an excellent catalytic performance toward the reduction of H<sub>2</sub>O<sub>2</sub>. The as-prepared electrochemical sensor exhibits fast response time of less than 3 s, large linear detection range of 0.025-135.2 mM ( $R^2=0.998$ ) and high sensitivity of 54.5  $\mu\text{A}\cdot\text{mM}^{-1}\cdot\text{cm}^{-2}$ . Moreover, the developed H<sub>2</sub>O<sub>2</sub> sensor has shown good anti-interference ability, outstanding stability and reproducibility, which represents a great potential for H<sub>2</sub>O<sub>2</sub> detection in practical applications.

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**Keywords:** Molybdenum disulfide, Silver nanoparticles, Hydrogen peroxide, Electrochemical sensor

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