A silicomolybdate/graphene/poly(3,4-Ethylenedioxythiophene) Composite Film as a Sensor for Sensitive Determination of Persulfate

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A poly(3,4-ethylenedioxythiophene)-electrochemically reduced graphene oxide (pEDOT-ERGO) composite film was synthesized by one-step electropolymerization approach on the Indium tin oxide (ITO). The composite was further decorated with H₄SiMo₁₂O₄₀ (SiMo₁₂) by electrochemical growth method and applied as an electrode material for the detection of persulfate. pEDOT acted as a bridge in the composite because it is positively charged and can interact with the negatively charged species. Data from scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS) and cyclic voltammetry demonstrated that the SiMo₁₂/pEDOT-ERGO film was successfully synthesized. The electrode surface has a granular-like protrusions structure and a large specific surface area. As a result of the catalytic activity of SiMo₁₂ and the good conductivity of pEDOT-ERGO, the modified electrode displays better electrocatalytic activity toward the reduction of persulfate. The sensor has a linear response in the 1.5-132 μ M range with a detection limit (0.48 μ M), better sensitivity (0.22 μ A μ M⁻¹cm²), favorable anti-interference and good stability.

Keywords: Graphene oxide, Polyoxometaltes, Poly(3,4-ethylenedioxythiophene), Persulfate, Electrocatalysis, Modified electrode

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