A Novel Electrochemical Sensor Based on the Synergistic Effect of Trace Platinum and Foliate $\text{Co}_{0.85}\text{Se}$ for the Determination of Dopamine

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Foliate cobalt selenide ($\text{Co}_{0.85}\text{Se}$) was synthesized by the hydrothermal method and was combined with trace platinum (Pt) to form a $\text{Pt}/\text{Co}_{0.85}\text{Se}$ material, which was modified on the surface of a glassy carbon electrode (GCE) to fabricate a novel nonenzymatic electrochemical sensor ($\text{Pt}/\text{Co}_{0.85}\text{Se}/\text{GCE}$) for the selective determination of dopamine (DA). On the $\text{Pt}/\text{Co}_{0.85}\text{Se}$ interface, well-separated oxidation peaks of DA, ascorbic acid (AA), and uric acid (UA) were observed due to the superior conductivity of $\text{Co}_{0.85}\text{Se}$ and the excellent catalytic activity of Pt. With the synergistic effect of Pt and $\text{Co}_{0.85}\text{Se}$, the linear range for DA detection was found to be 0.50–22.0 μM with a detection limit of 0.39 μM ($\text{S/N}=3$) and a high sensitivity of 2306 $\mu\text{A mM}^{-1} \text{cm}^{-2}$. Furthermore, the proposed sensor exhibited high selectivity for the determination of DA in the presence of UA, AA, and other potential interferences, which indicated that the sensor showed great potential for practical and reliable DA analysis of serum samples.

Keywords: Electrochemical sensor, Cobalt selenide, Dopamine, Platinum

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