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An electrochemiluminescence biosensor for dopamine detection using poly(luminol-benzidine sulfate) electrode modified by tyramine oxidase

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1. Optimization of polymerization conditions for luminol-benzidine sulfate

With the concentration of 1 mM luminol and 1.5 mM benzidine sulfate, different polymerization cycles were carried out. Fig. 1a shows that 40 cycles gives the highest ECL signal. The composite films also exhibit distinct ECL intensity with different luminol to benzidine sulfate ratio. The ratio of 2:3 for luminol to benzidine sulfate shows the best ECL propery (Fig. 1b). Therefore, 40 polymerization cycles and 2:3 luminol to benzidine sulfate ratio is used as the optimized condition for the composite film synthesis.

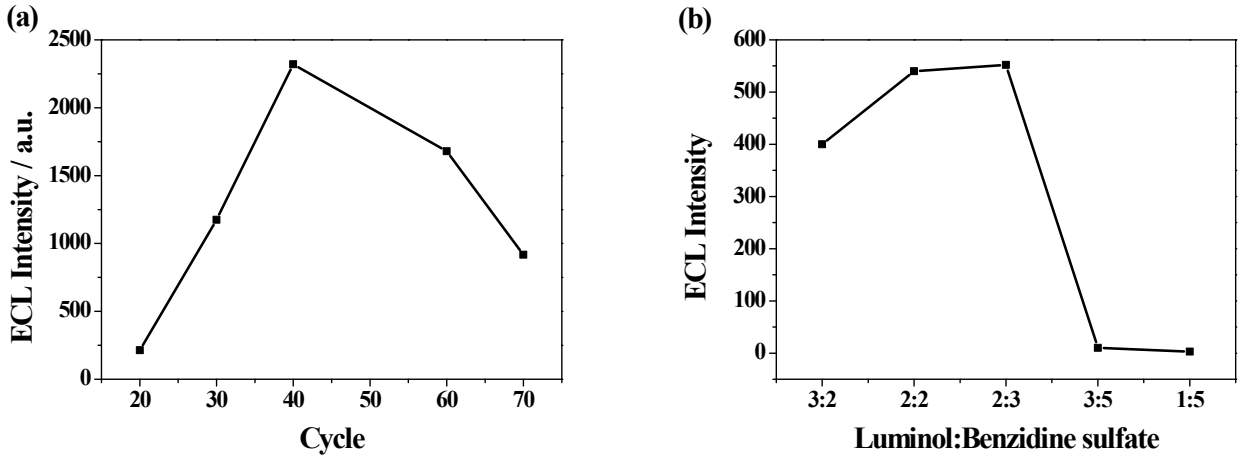

Fig.1 ECL intensity as a function of (a) polymerization cycle number and, (b) ratio of luminol to benzidine sulfate for the synthesis of composite film

2. Optimization of tyramine oxidase immobilization quantity

Tyramine oxidase was synthesised on the composite film with cyclic voltammetry cycles of 10, 20, 30 and 40. The ECL intensity increases with increasing cycle number. The ECL intensity changes slightly among the cycle number of 20, 30 and 40. Therefore, we chose 20 cycles as the tyramine oxidase immobilization parameter so as to shorten the experimental time.

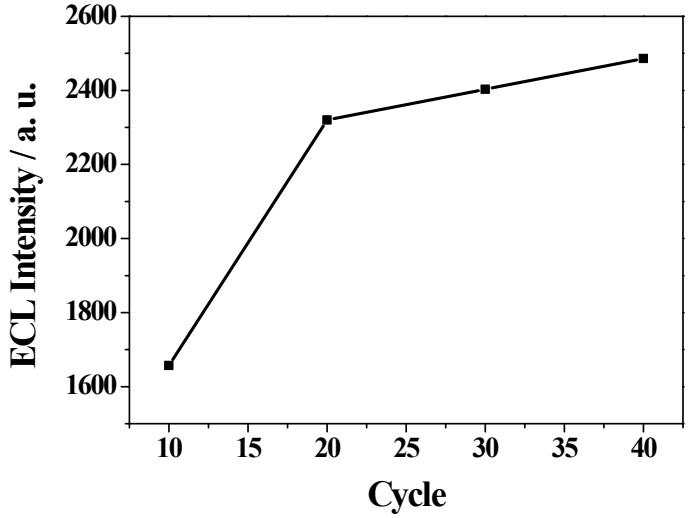

Fig. 2 ECL intensity vs. tyramine oxidase cyclic voltammetry cycles