Electronic Supplementary Information

An electrochemiluminescent microRNA biosensor based on hybridization chain reaction coupled with hemin as the signal enhancer

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**S1. the SEM image of the Au NPs**

As shown in the Fig. S1., Au NPs were electrodeposited on the surface of the electrode rather than a Au thin layer film, which provided valuable data about the real shapes of the nanoparticles.

![Fig. S1. SEM image of Au NPs.](image)

**S2. ECL comparison of hemin and HRP for miRNA detection**

Both hemin and HRP showed peroxidatic activity on luminol/H$_2$O$_2$ system through catalyzing the decomposition of H$_2$O$_2$. In order to further investigate the effect of hemin and HRP, we detected the ECL intensity with hemin (7 µM) and HRP (7 µM) modified GCE in 2 mL PBS (pH 7.4) with 1.00×10$^{-4}$ M luminol and 3.50×10$^{-5}$ M H$_2$O$_2$, respectively. As can be seen from Fig. S2, HRP/GCE showed a lower ECL intensity, indicating the poor catalytic efficiency to H$_2$O$_2$ (curve blue). However, an obviously amplified ECL signal of hemin/GCE was achieved (curve red). Such results indicated the excellent amplified property of the proposed biosensor with hemin, which may ascribe to the following reasons: hemin, which is enable to maintain high catalytic activities, showed remarkable catalyzing performance towards H$_2$O$_2$. Besides, hemin was introduced by intercalating into the grooves of the dsDNA, so there were
amounts of hemin to catalyze the decomposition of H$_2$O$_2$. The biocompatible dsDNA could not only improve the amount of immobilized hemin but also efficiently maintain its catalytic activity and improve the stability. However, there were a small number of HRP immobilized on the surface of the electrode. Based on the above advantages, application of hemin modified electrode is becoming a commonly used method to sensitize and amplified the ECL signal$^{1-2}$.

**Fig. S2.** ECL intensity of the biosensor in 2 mL PBS (pH 7.4) with 1.00×10$^{-4}$ M luminol and 3.50×10$^{-5}$ M H$_2$O$_2$ by using different catalysts: the blue one is the biosensor with 7 µM HRP as the enhancer, the red one is the biosensor with 7 µM hemin as the enhancer.

**Reference:**