Electronic Supporting Information

Electrochemiluminescence Sensor Using Quantum Dots Based on G-quadruplex Aptamer and the Detection of Pb^{2+}

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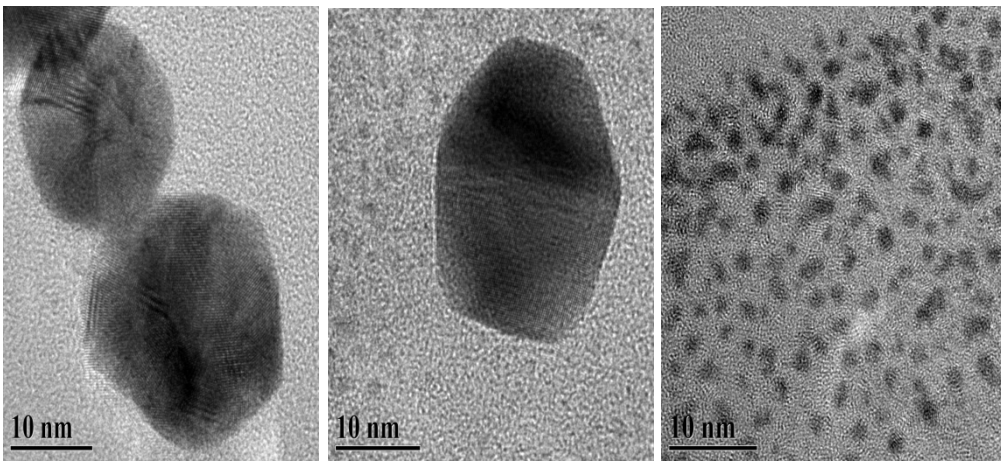
The optimization of experimental conditions

In G-rich DNA, contiguous G-quartets stack to give structures of G-quadruplex. The resulting aptamer-Pb^{2+} octamer is a sandwich of two hydrogen-bonded G-quartets. The pH value was investigated considering its impact on hydrogen bonding. The intensity of ECL signal as a response of the system gradually increases with the increasing of pH value, reaching the highest at pH=7.0. The intensity of ECL signal decreases gradually in an alkaline environment, which may be resulted from the generation of precipitation $Pb(OH)_2$. Therefore, the pH value was selected at 7.0 to detect Pb^{2+} in this experimental system.The ECL signal of the experiment was based on the formation of G-quadruplex by Fe_3O_4/Au-Aptamer and Pb^{2+}, which exposed 3-NH_2 of aptamer to bind to QDs. Therefore, the reaction time after adding Pb^{2+} is also an important parameter affecting the sensitivity of the system. If the reaction time is too short, no more G-quadruplex structure would be formed, which affects the detection sensitivity of the system; In this experiment, the reaction time of Pb^{2+} was also studied. The intensity of ECL signal is the maximum when the reaction time of Pb^{2+} is about 2 h, corresponding to the largest number of G-quadruplex structures. In the present study, the reaction time of Pb^{2+} was controlled at 2h.

TEM analysis of nanoparticles of Fe_3O_4, Fe_3O_4/Au NPs and CdTe quantum dots were performed by a transmission electron microscope (JEOL, JEM-2100F 3010, Japan).



a b c

Fig. S1 TEM images of nanoparticles of Fe_3O_4 (a), Fe_3O_4/Au NPs (b) and CdTe quantum dots (c)