Electronic Supplementary Material (ESI) for Analyst.

Electronic Supplementary Information

Highly sensitive and selective detection of Pb^{2+} ions using a novel and simple DNAzyme-based quartz crystal microbalance with dissipation biosensor

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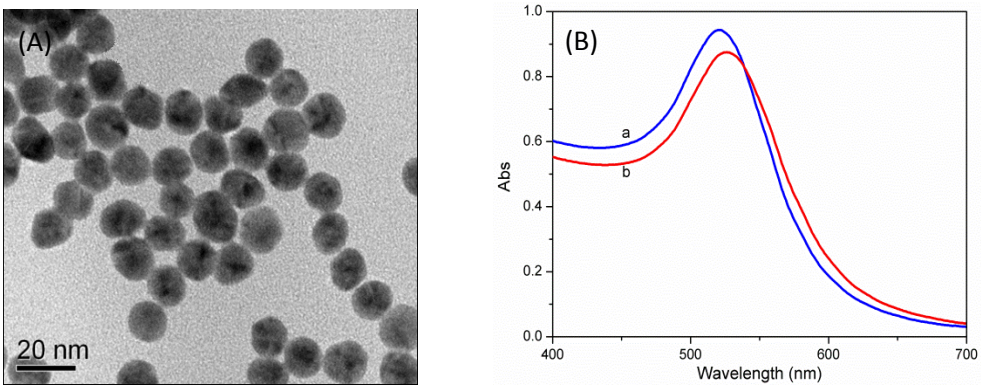

Fig. S1 (A) TEM image of AuNPs and (B) UV-Vis absorption spectra of AuNPs before (a) and after (b) immobilization with thiol-substrate.

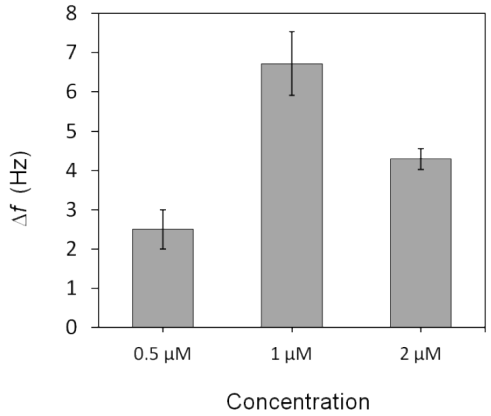

Fig. S2 The frequency response of 500 nM of Pb^{2+} ions with different concentration of DNAzyme probe on the sensor surface. The surface density of the sensor was controlled by changing the concentration of DNAzyme from 0.5 to 2 μM. With increasing amount of DNAzymes bound to the sensor surface, the frequency change increased as more substrate strands were hybridized with DNAzymes to form the Pb^{2+}-active structure. The frequency change decreased after the concentration of DNAzyme increase to 2 μM due to steric hindrance effect. Therefore, 1 μM DNAzyme was chosen as the optimum condition for sensor fabrication according to the result.

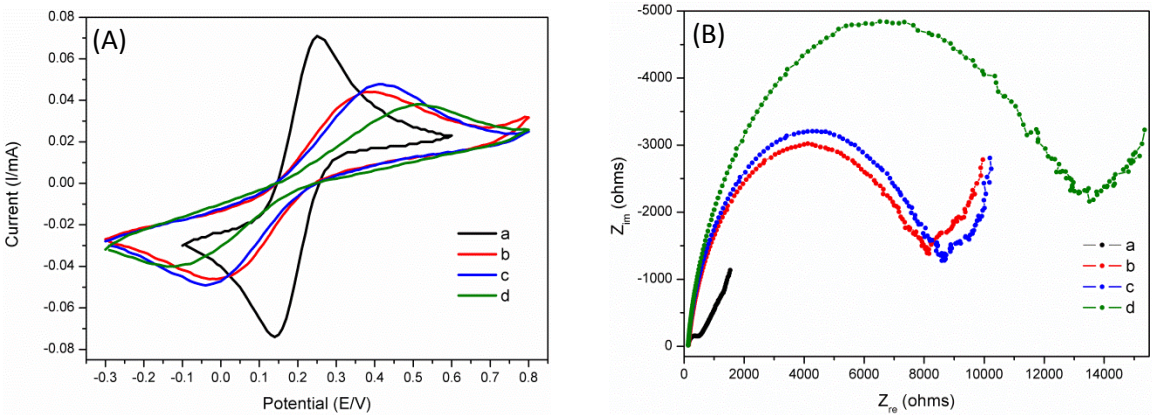

Fig. S3 Characterization of the QCM-D surface during sensor fabrication by (A) cyclic voltammetry (CV) and (B) electrochemical impedance spectroscopy (EIS). Conditions: working buffer 25 mM HEPES including 100 mM NaCl in the presence of 10 mM $K_3Fe(CN)_6$ and 10 mM $K_4Fe(CN)_6$, CV: scan rate 50 mV/s, EIS: applying 5 mV alternative voltage in the frequency range of 100 mHz to 100 kHz. (a) bare gold; (b) after immobilization of GR5-E; (c) after backfilled with MCH; (d) after hybridization with substrate-functionalized AuNPs.