Supporting Information

Ag Nanocube Coupled with Heating Enhanced DSN-Assisted Cycling Amplification for Surface-Enhanced Raman Spectroscopy Detection of microRNA-21

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Figure S1

Temperature characterization and calibration for the heated electrode

The surface of the heated electrode is indirectly heated by the internal heating-element that is controlled by the temperature-controller, resulting in a difference between the actual temperature of the electrode surface (T_s) and the setting temperature of temperature-controller (T_h) , so the T_s needs to be calibrated. We calibrate the relationship between T_h and T_s by the open circuit potential (OCP) method in 5 mM $[Fe(CN)_6]^{3-/4-}$ + 0.5 M KCl solution. Put the heated electrode into the solution, then connect the heated electrode to the electrochemical workstation and temperature-controller. Change the T_h in the temperature-controller at regular intervals, and record the corresponding potentials (Figure S1-A). Then the potentials can be converted to T_s by the temperature-potential coefficient which is − 1.56 $mV \cdot K^{-1}$ for 5 mM $[Fe(CN)_6]^{3-/4-}$ + 0.5 M KCl solution. At last, we can obtain a linear

relationship between T_s and T_h (Figure S1-B). The linear regression equation was $T_s = 0.944\ T_h - 0.217$ ($R^2 = 0.9999$). Later, once we set a T_h, a corresponding T_s can be obtained according to this linear equation. More details refer to ref [39].

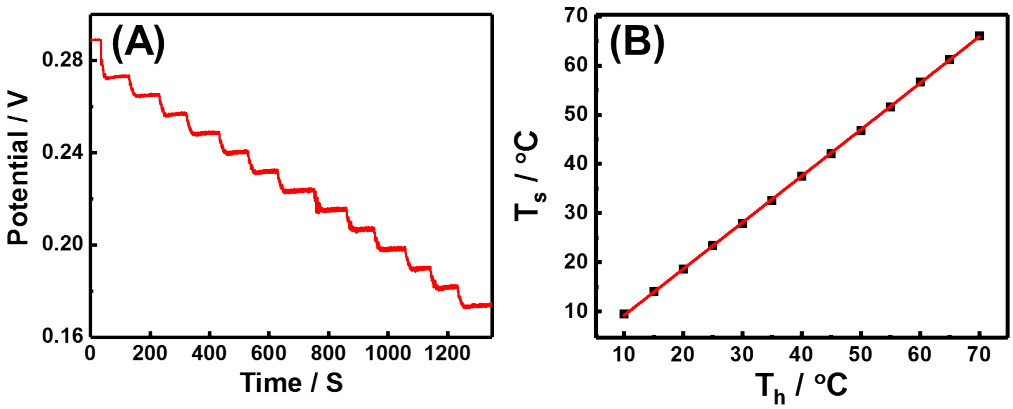

Figure S1. (A) The open circuit potential graph of heated electrode in 5 mM $[Fe(CN)_6]^{3-/4-}$ + 0.5 M KCl solution. (B) The linear relationship between surface temperature of the heated electrode (T_s) and the setting temperature of the temperature-controller (T_h).

Figure S2 Characterization of the stability of Au-S bonds

The dissociation of pDNA from the HAuE surface caused by the break of the Au-S bonds when the electrode is heated may cause false positive result. So we characterized the stability of Au-S bond by EIS at 55°C (the optimized electrode temperature). As can be seen in Figure S2， R_{ct} of pDNA/HAuE (Figure S2-a) was only slightly weakened after heated for 60 min at 55°C (Figure S2-b), suggesting the enough stability of Au-S bonds at 55°C in this work.

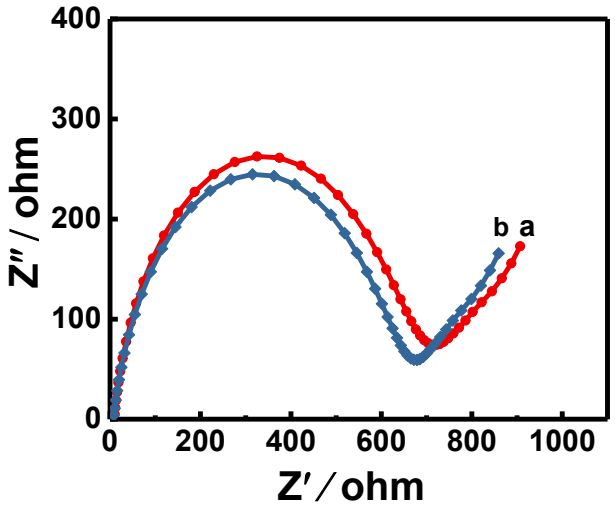

Figure S2. EIS curves of pDNA/HAuE before (a) and after (b) heated at 55°C for 60 min. The solution was 5 mM $[Fe(CN)_6]^{3-/4-}$ containing 0.5 M KCl.