Supporting information

A Simple and Highly Sensitive Thymine Sensor for Mercury Ion Detection Based on Surface Enhanced Raman Spectroscopy and the Mechanism Study

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Figure S1. SERS spectra of three Au NRs@T substrates with different concentrations Hg^{2+} ion. (A) 0 M, (B) 0.1 nM, (C) 1 nM, (D) 10 nM, (E) 100 nM and (F) 1 μM.

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Table S2. The LOD of SERS methods for Hg^{2+} ion detection.

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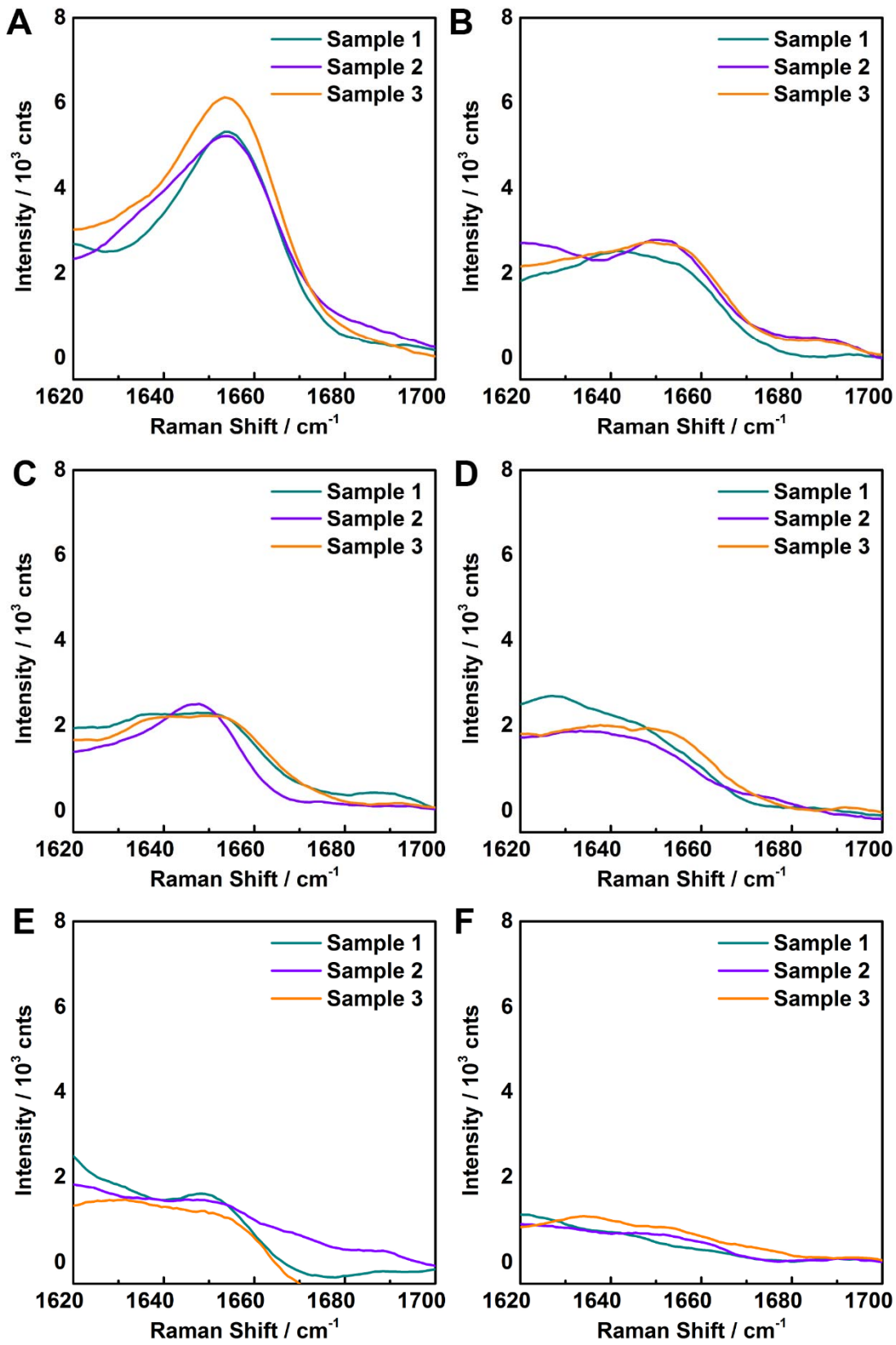
Figure S4. Mass spectrum of the Au NRs@T after 1 mM Hg^{2+} ion adsorption.



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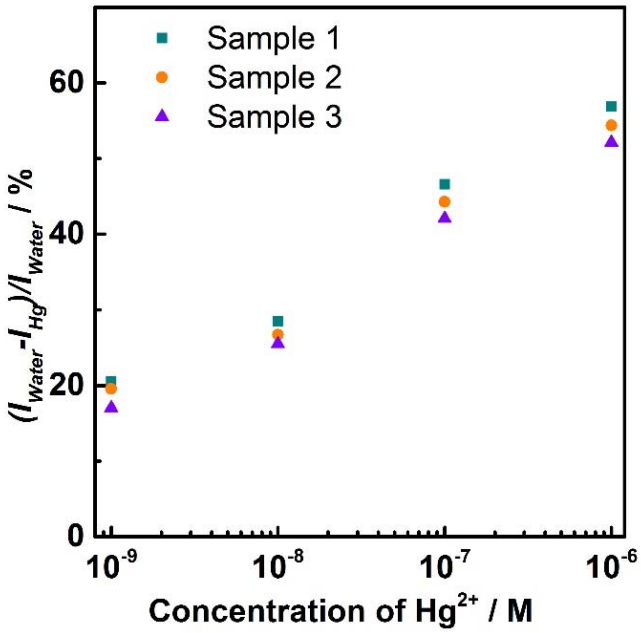


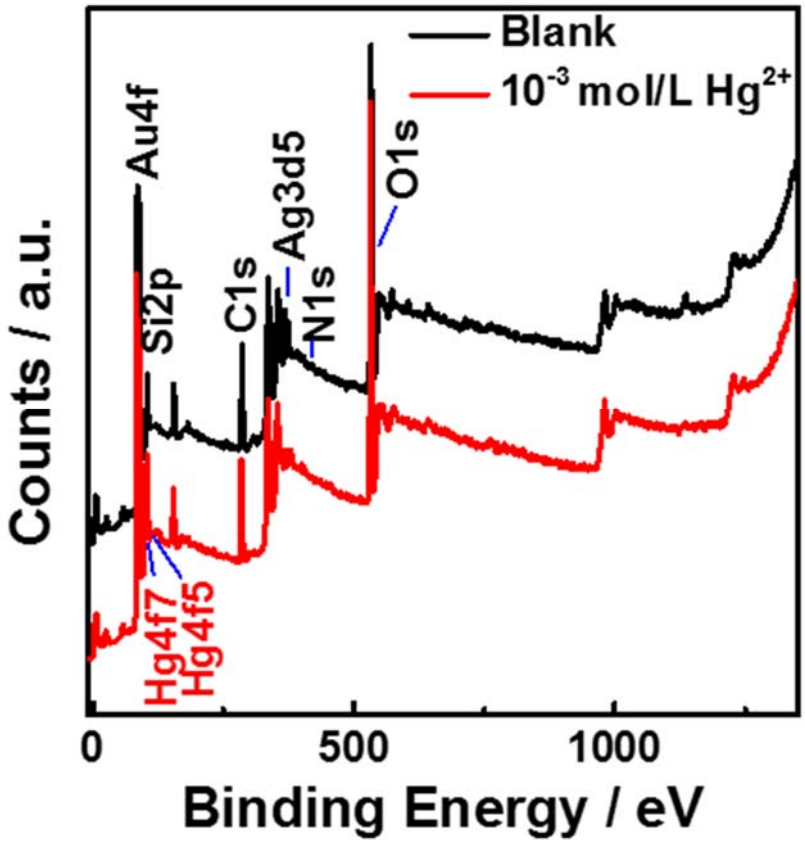
Figure S2. Variation of SERS intensity of three random point on a Au NRs@T substrate as a function of Hg^{2+} ion concentration.

Table S1. The LOD of different method for Hg^{2+} ion detection

Method	LOD	Reference
Ultraviolet visible light absorption spectrometry (UV-Vis)	1 nM (0.2 ppb)	*Angew. Chem. Int. Ed.* **2008**, *47*, 3927.
Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES)	0.45 nM (0.09 ppb)	*Int. J. Environ. Anal. Chem.* **2011**, *91*, 1024.
Metal NPs based fluorescent with DNA sensors	1 nM (0.2 ppb)	*Angew. Chem. Int. Ed.* **2008**, *47*, 8386.
Ag NPs-based colorimetric assays with DNA sensor	10 nM (2 ppb)	*Talanta* **2012**, *97*, 388.

Table S2. The LOD of SERS methods for Hg^{2+} ion detection.

Substrate	LOD	Reference
Au nanorods with thymine sensor	0.1 nM (0.02 ppb)	This work
Au nanoparticles/graphene with DNA sensor	0.1 nM (0.02 ppb)	*ACS Appl. Mater. Inter.* **2013**, *5*, 7072.
Oligonucleotide-functionalized magnetic silica sphere@Au nanoparticles with DNA sensor	0.1 nM (0.02 ppb)	*ACS Appl. Mater. Inter.* **2014**, *6*, 7371.
Ag with DNA and PATP hybrid sensor	0.1 pM (0.02 ppt)	*Chem. Commun.* **2011**, *47*, 9360.
Au nanowire with DNA sensor	0.5 nM (0.1 ppb)	*Lab Chip.* **2012**, *12*, 3077.
Au nanoparticles with DNA sensor	1 nM (0.2 ppb)	*Environ. Sci. Technol.* ***2009***, *43, 5022.*
Au nanoparticles decorated silicon nanowire array with DNA sensor	1 pM (0.2 ppt)	*Anal. Chem.* **2015**, *87*, 1250.
Au nanorods with DNA sensor	4 nM (0.8 ppb)	*Anal. Met.* **2015**, *7*, 4514.
Au@Ag nanoparticles with DNA sensor	5 pM (1 ppt)	*Biosens. Bioelectron.* **2015**, *69*, 142.
Au TNAs/n-Layer graphene/Au nanoparticles sandwich structure with DNA sensor	8.3 nM (1.66 ppb)	*Small* **2017**, *13*. DOI: 10.1002/smll.201603347
Au/Ag core–shell nanoparticles with DNA sensor	10 pM (2 ppt)	*Lab Chip.* **2013**, *13*, 260.
Au microshell with DNA sensor	50 nM (10 ppb)	*Chem. Commun.* ***2010***, *46, 5587.*



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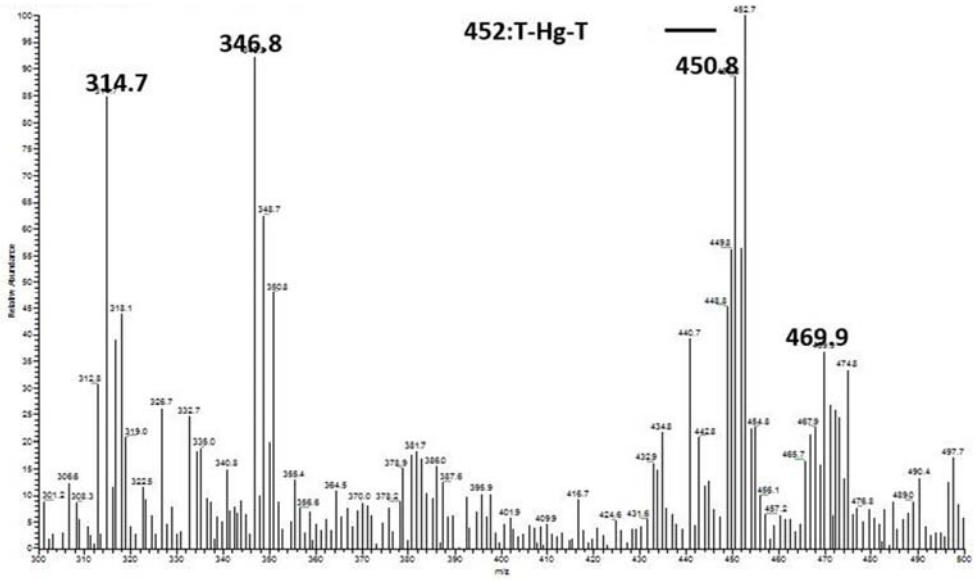

Figure S4. Mass spectrum of the Au NRs@T after 1 mM Hg^{2+} ion adsorption.