

## **Supporting Information**

### **Horseradish peroxidase-repeat assay based on tyramine signal amplification for highly sensitive H<sub>2</sub>O<sub>2</sub> detection by Surface-Enhanced Raman Scattering**

Cuicui Fu<sup>a</sup>, Yuqiu Wang<sup>b</sup>, Xue Tian<sup>a</sup>, Yan Wu<sup>a</sup>, Haiyan Cao<sup>a</sup>, Yangyang Li<sup>a,\*</sup>, and Young Mee Jung<sup>c,\*</sup>

<sup>a</sup> *Chongqing Key Laboratory of Inorganic Special Functional Materials, College of Chemistry and Chemical Engineering, Yangtze Normal University, Fuling, Chongqing 408100, P. R. China*

<sup>b</sup> *MOE Key laboratory of Laser Life Science & Institute of Laser Life Science College of Biophotonics, South China Normal University, Guangzhou 510631, P. R. China*

<sup>c</sup> *Department of Chemistry, Institute for Molecular Science and Fusion Technology, Kangwon National University, Chuncheon 24341, Korea*

## Optimization of Experimental Conditions

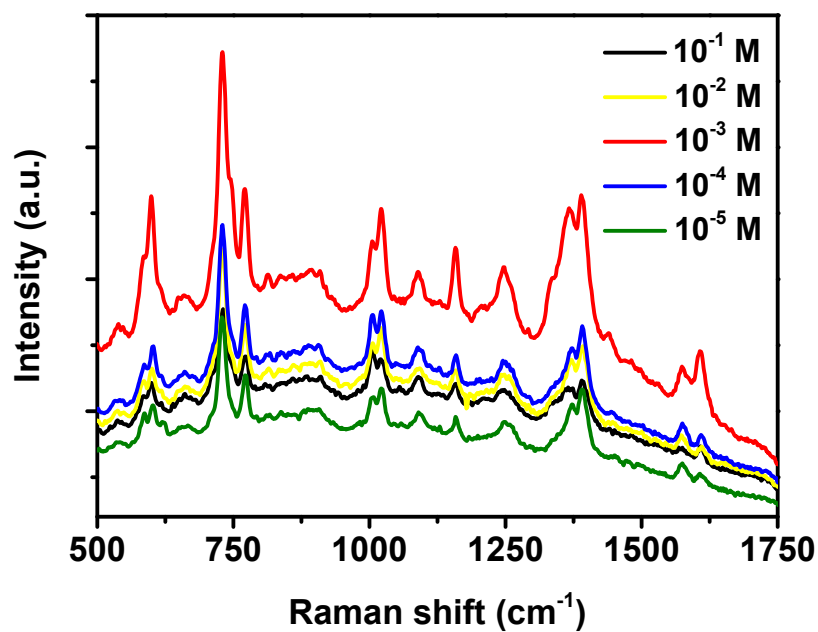


Fig. S1. SERS spectra of the sensing systems with different cysteamine concentrations.

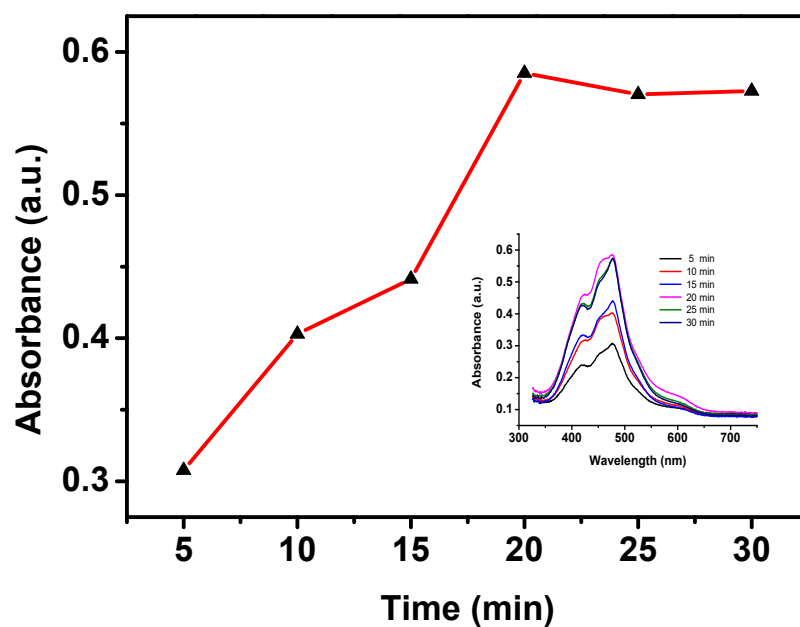


Fig. S2. UV-Vis spectra of the catalytic reaction with different incubation times for Au-HRP conjugation.

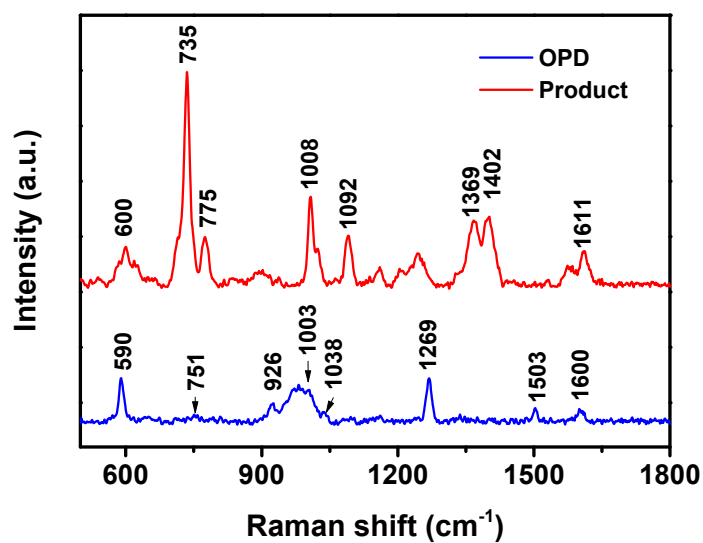


Fig. S3. SERS spectra of OPD and the product DAP.

**Table S1.** Main SERS Band Assignments of OPD and DAP

Vibrational bands/cm <sup>-1</sup>		Assignment
OPD	DAP	
590	600	ring deformation
751	735 775	C-H wagging ring deformation, ring stretching
1003	1008	ring stretching and in-plane bending
1038		ring deformation, ring breathing
1269	1369, 1402	C-N stretching in the benzenoid C-N <sup>+</sup> -stretching, C=N stretching
1503		ring deformation, C-H in-plane bending
1600	1611	NH <sub>2</sub> scissoring

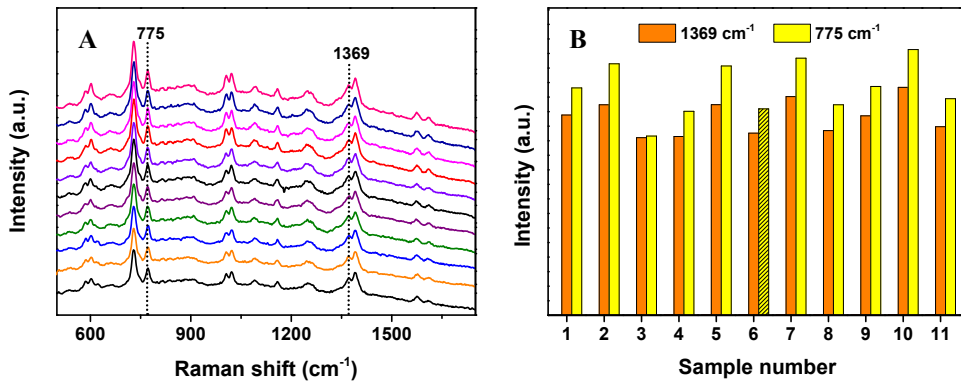


Fig. S4. (A) SERS spectra with Au-re-HRP assay in the substrate solution of 0.1 mM H<sub>2</sub>O<sub>2</sub> from 11 different sensors. (B) The intensities of two different bands from 11 trials.

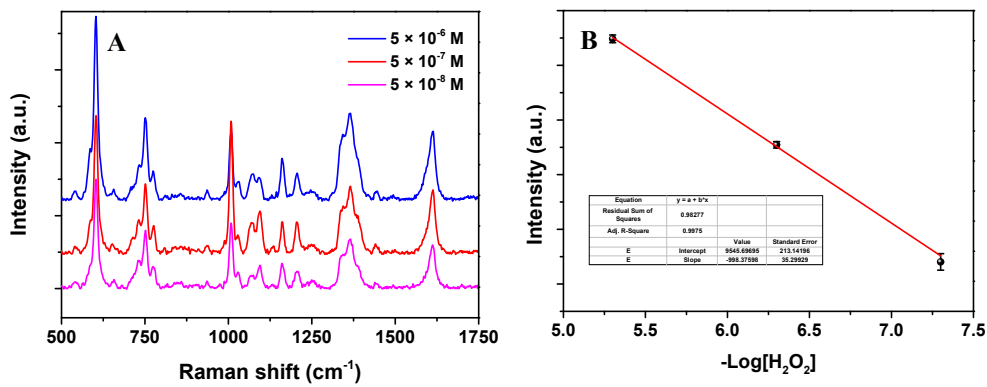


Fig. S5. (A) SERS spectra of samples with different H<sub>2</sub>O<sub>2</sub> concentrations in serum samples. (B) Quantitative analysis plot showing the relationship between band intensity at 1366 cm<sup>-1</sup> and the logarithm of H<sub>2</sub>O<sub>2</sub> concentration. The error bar indicates three independent measurements.