Supporting Information

Sensitive Detection of Extracellular Hydrogen Peroxide Using Plasmon-Enhanced Electrochemical Activity on Pd-Tipped Au Nanobipyramids

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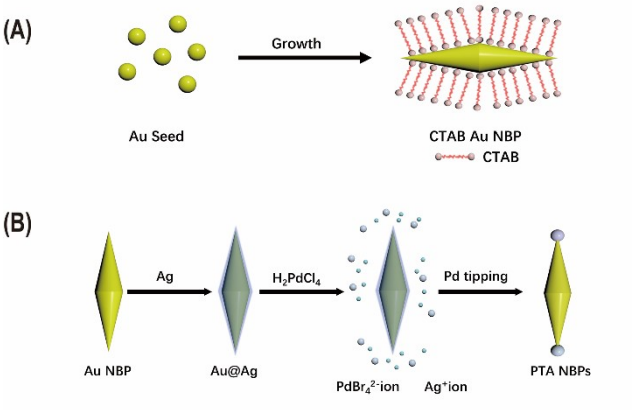
S1: Synthesis of Au NBRs

The synthesis of Au NBPs was carried out using the seed-mediated growth method.[1] Initially, gold seeds were prepared following a previously reported procedure. A solution of CTAB (100 mL, 100 mM) was prepared, and then $HAuCl_4$ (5 mL, 10 mM), $AgNO_3$ (1 mL, 10 mM), and HCl (2 mL, 2 M) were added to the CTAB solution. Subsequently, AA (0.8 mL, 100 mM) was added to the solution and vigorously stirred. The color of the mixture gradually changed from yellow to colorless. Then, under vigorous stirring, 0.2 mL of the gold seeds was added to the growth solution. The mixture was allowed to stand at 30°C for 2 hours, and the Au NBPs were obtained by centrifugation at 7000 rpm for 10 minutes.

S2: Synthesis of the PTA NBP[2]

The obtained Au NBPs were dispersed in a CTAC solution (2 mL, 0.08 M). Then, $AgNO_3$ (10 μL, 0.01 M) and AA (5 μL, 0.1 M) were added to the solution under gentle shaking. The mixture was placed in an oil bath at 60°C and 100 rpm for 4.5 hours. During this time, Ag was selectively grown on the Au NBPs, resulting in the formation of Au NBP@Ag nanostructures. The resulting sample was centrifuged twice at 6000 rpm for 10 minutes, and the precipitate was redispersed in a CTAB solution (2 mL, 0.003 M). To form metal nanoparticles at the tips of the Au NBPs, H_2PdCl_4 (0.001 M) and ascorbic acid (0.01 M) were sequentially added to the solution under gentle shaking.



Scheme S1 Schematic diagram of the synthesis process of Au NBPs and PTA NBPs.

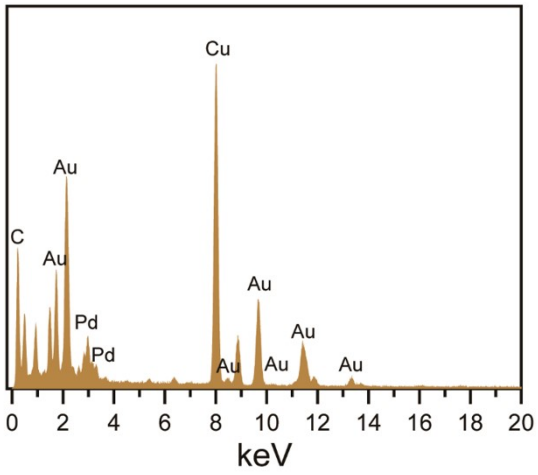


Figure S1 TEM-EDS of PTA NBPs

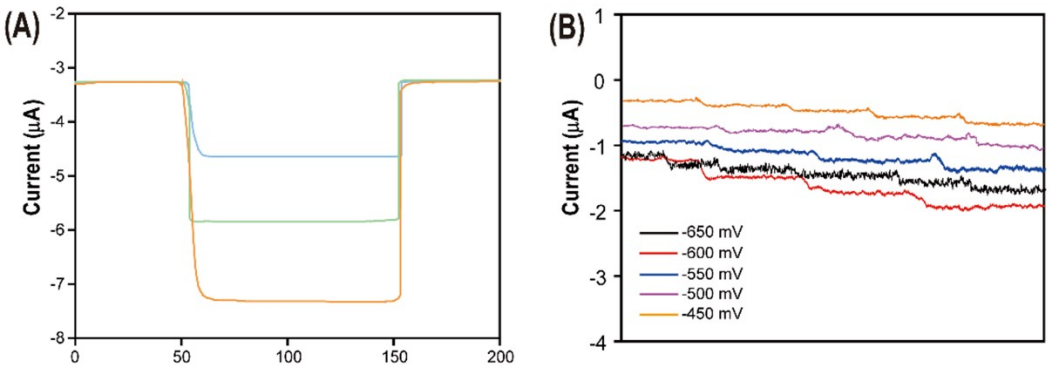


Figure S2 Electrochemical quantitative optimization of PTA NBPs under LSPR excitation. (A) Amperometric curves of different laser power in 0.1 M PBS (pH 7.4) containing 0.2 mM H_2O_2; (B)

The amperage response of PTA NBP/GC electrode to the continuous addition of H_2O_2 in 0.1 M PBS (pH 7.4) at different potentials when the laser power density is 1.5 W cm^{-2}.

References

1. A. Sanchez-Iglesias, N. Winckelmans, T. Altantzis, S. Bals, M. Grzelczak and L. M. Liz-Marzan, *J. Am. Chem. Soc.*, 2017, **139**, 107-110.
2. X. Z. Zhu, H. K. Yip, X. L. Zhuo, R. B. Jiang, J. L. Chen, X. M. Zhu, Z. Yang and J. F. Wang, *J. Am. Chem. Soc.*, 2017, **139**, 13837-13846.