Electronic Supplementary Information

 $Pt_{74}Ag_{26}$ nanoparticle-decorated Ultrathin MoS₂ Nanosheets as Novel Peroxidase Mimics for Highly Selective Colorimetric Detection of H_2O_2 and Glucose

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Figure S1. Representative AFM, SEM and HRTEM images, XRD pattern and FT-IR spectra of the as-prepared MoS₂-PAH. (a) AFM image (inset: lineprofile of A-B line indicated in Figure S1a); (b) SEM image; (c) HRTEM image (inset: corresponding fast Fourier transform (FTT) pattern); (d) magnified HRTEM image indicated in Figure S1c; (e) XRD pattern and (f) FT-IR spectra.



Figure S2. (a) XPS survey spectrum, (b) high-resolution peak-fitting XPS spectra of

Mo 3d and (c) S 2p regions as well as (d) Zeta potential of the as-prepared MoS₂-PAH.



Figure S3. (a-e) Different magnifications of TEM images of the as-prepared MoS_2 -

Pt74Ag26, (f) size distribution histogram.



Figure S4. Representative TEM images of the as-prepared MoS_2 -Pt (a) and different MoS_2 -PtAg hybrids with Pt/Ag feeding molar ratios of 3 : 1 (b), 1 : 1 (c) and 1 : 3 (d), respectively.



Figure S5. (a) Representative HAADF-STEM image of the $MoS_2-Pt_{74}Ag_{26}$ nanohybrids, elemental maps for (b) Pt and (c) Ag, (d) overlapped elemental maps of Pt and Ag, (e) EDX line-scanning profile across a Pt-Ag NP (inset) indicated in Figure S5a.



Figure S6. UV-Vis spectra of material solution (a), TMB solution (b), TMB- H_2O_2 solution (c) and TMB- H_2O_2 -material solution (d) in 0.2 M acetate buffer (pH 4.0). Inset: photographs of different solutions.



Figure S7. (a) Representative TEM image and (b) size distribution histogram of the as-prepared $Pt_{73}Ag_{27}$ NPs.



Figure S8. Relative activity of different materials (a), MoS_2 -PtAg with different Pt/Ag feeding ratios (b), the long-term stability (c) and the reusability (d) after repeated cycles of H_2O_2 sensing of MoS_2 -Pt₇₄Ag₂₆. The maximum point was set 100 %.



Figure S9. (a) Representative TEM image and (b) size distribution histogram of the recycled nanohybrids.



Figure S10. Dependence of the catalytic activity of MoS₂-Pt₇₄Ag₂₆ on (a) temperature,
(b) pH and (c) H₂O₂ concentration. The maximum point in each curve was set 100 %.



Figure S11. The effect of MoS₂-PtAg on the formation of hydroxyl radical with terephthalic acid (TA) as a fluorescence probe. (a) TA/MoS₂-Pt₇₄Ag₂₆; (b) TA/H₂O₂; (c) TA/MoS₂-Pt₇₄Ag₂₆/H₂O₂.



Figure S12. ESR spectra for the oxidation of TMB catalyzed by MoS_2 -PtAg: (a) buffer/TMB/H₂O₂; (b-c) buffer/H₂O₂/MoS₂-PtAg for 0 min and 5 min; (d) buffer/H₂O₂/MoS₂-PtAg/TMB.