Electronic Supplementary Material (ESI) for RSC Advances.
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Supplementary information

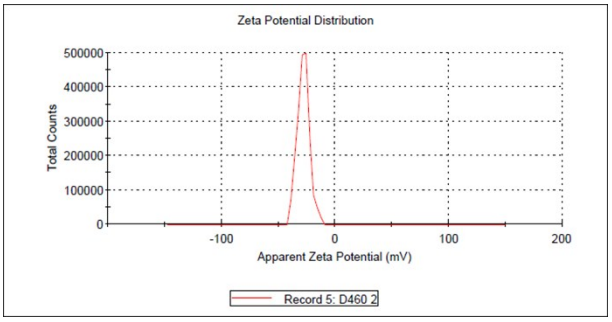

Fig. S1. Zata potential distribution of Au-Ag alloy NPs

Table S1

The concentration of Au element and Ag element in Au-Ag alloy NPs synthesized at different synthesis times at the Au^{3+}/Ag^{+} molar ratio of 1:3.5 in raw materials. (ICP)

Synthesis Time (min)	Au Concentration (mg/L)	Ag Concentration (mg/L)
0*	2.81	5.40
0.2	2.80	0.83
5	2.80	1.54
60	2.79	4.59

* The concentrations of Au ions and Ag ions in raw materials were obtained by calculation.

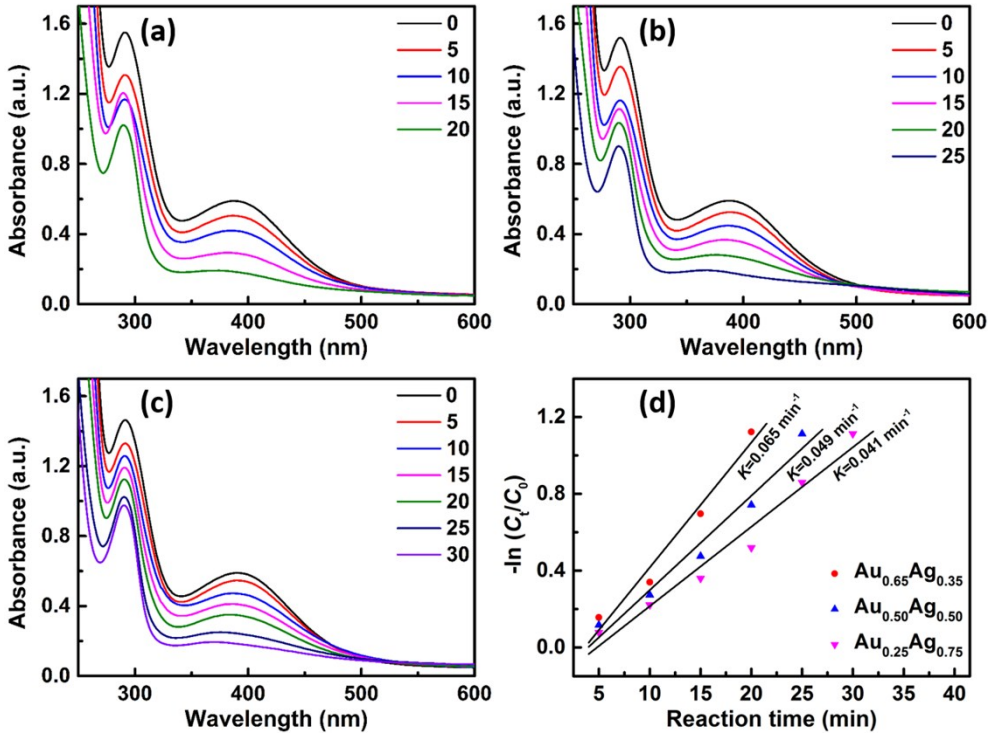

Fig. S2. UV-vis absorption spectra of the reduction of 3-nitrophenol solution using 500 μL of different Au-Ag alloy NPs hydrosol as photocatalysts. (a) $Au_{0.65}Ag_{0.35}$; (b) $Au_{0.50}Ag_{0.50}$; (c) $Au_{0.25}Ag_{0.75}$. (d) The plot of $-\ln(C_t/C_0)$ versus the reaction time based on different photocatalysts.

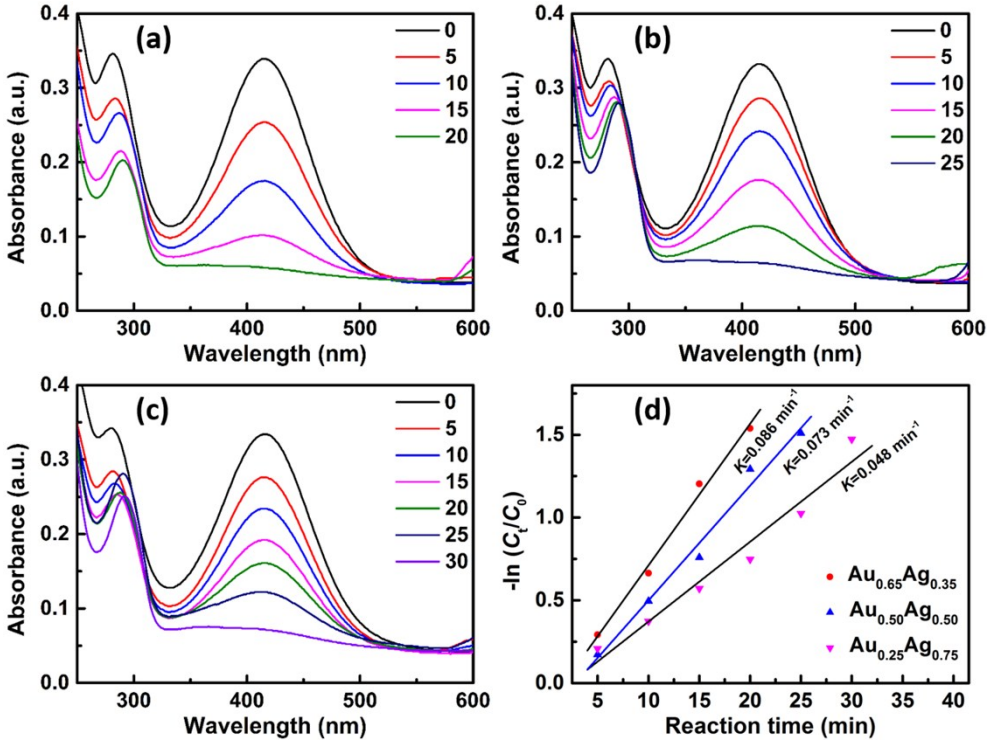

Fig. S3. UV-vis absorption spectra of the reduction of 2-nitrophenol solution using 500 μL of different Au-Ag alloy NPs hydrosol as photocatalysts. (a) $Au_{0.65}Ag_{0.35}$; (b) $Au_{0.50}Ag_{0.50}$; (c) $Au_{0.25}Ag_{0.75}$. (d) The plot of -ln(C_t/C_0) versus the reaction time based on different photocatalysts.

Equation S1: $$BH_4^- + 2H_2O \xrightarrow{Au-Ag\ alloy\ NPs} BO_2^- + 4H_2$$

Equation S2: $$HO - C_6H_4 - NO_2 + 3H_2 \xrightarrow{Hydrogenation} HO - C_6H_4 - NH_2 + 2H_2O$$

Table S2

The SPR wavelength, the average size, and the rate constant data for Au-Ag alloy NPs obtained at different synthesis parameters.

Sample	SPR Wavelength (nm)	Average Size (nm)	Rate constant for the conversion of 4-NP to 4-AP $K_{4\text{-NP}}$ (min^{-1})	Au^{3+}/Ag^{+} molar ratio in raw materials	Synthesis time (min)
$Au_{0.65}Ag_{0.35}$	490	7.1±0.8	0.135	1:1	2
$Au_{0.50}Ag_{0.50}$	460	8.0±1.4	0.111	1:3.5	5
$Au_{0.25}Ag_{0.75}$	430	10.9±1.4	0.086	1:5	15