Supporting Information

Fluorescent Au Nanoclusters Stabilized by Silane: Facile Synthesis, Color–tunability and Their Photocatalytic Properties

Shaochen Zhou,[1,2] Yanyan Duan,[1, 2] Fu Wang[1, *] and Chuanyi Wang[1, *]

Laboratory of Environmental Sciences and Technology, Xinjiang Technical Institute of Physics & Chemistry; Key Laboratory of Functional Materials and Devices for Special Environments, Chinese Academy of Sciences, Urumqi, Xinjiang 830011, China
[2]University of Chinese Academy of Sciences, Beijing 100049, China
* Corresponding author. Email: cywang@ms.xjb.ac.cn and wangfu@ms.xjb.ac.cn

Table 1. Maximum excitation and emission wavelengths ($\lambda_{ex}/\lambda_{em}$), as well as emission color of Au NCs synthesized with different volume ratios of $HAuCl_4$ solution (0.01 M) versus MPTS and THF

$HAuCl_4$: MPTS: THF (Volume ratio)	$\lambda_{ex}/\lambda_{em}$ (nm)	Emission color
10:500:0	460/538	Greenish yellow
10:400:100	346/542	Pale yellow
10:300:200	354/547	Yellow
10:200:300	394/550	Yellow
10:100:400	442/554	Orange yellow
10:10: 490	430/558	Orange
500:10:0	435/568	Orange
500:20:0	441/574	Orange red
500:30:0	445/580	Orange red

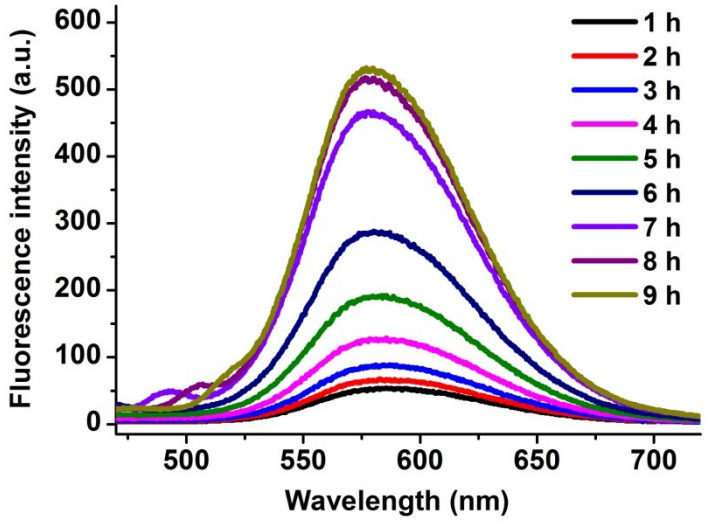

Figure S1. Fluorescence spectra of Au NCs recorded at different reaction time.

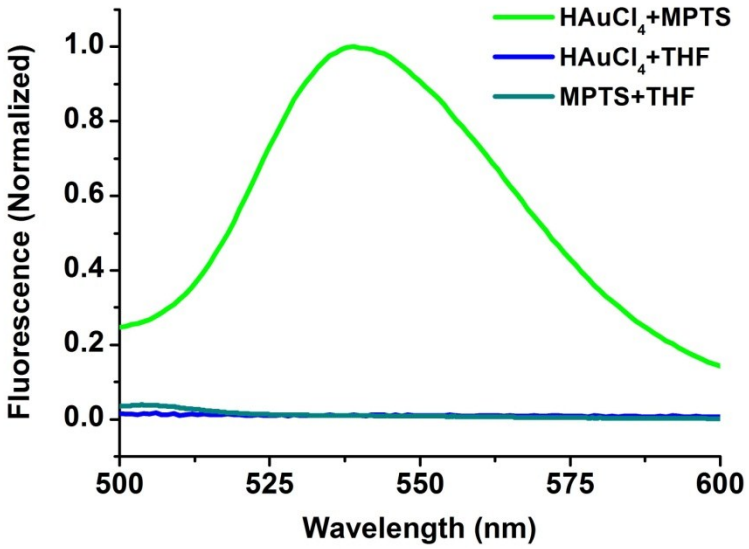

Figure S2. Fluorescence spectra of $HAuCl_4$+MPTS, $HAuCl_4$+THF and MPTS+THF systems after UV irradiation for 8 hours (excitation wavelength: 440 nm).

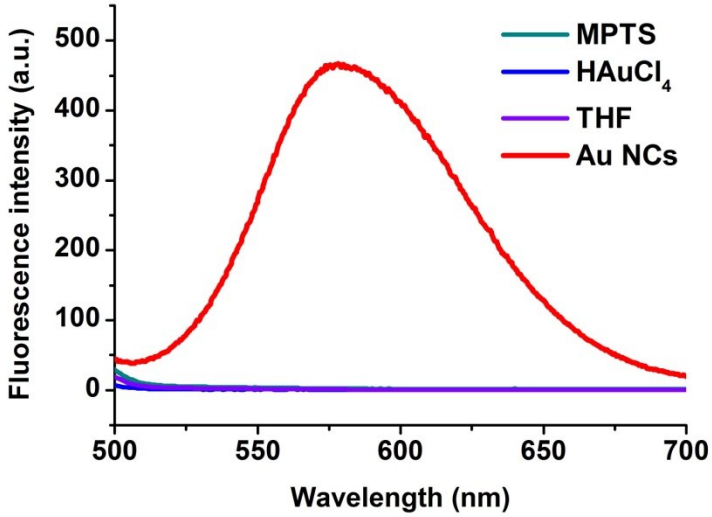

Figure S3. Fluorescence spectra of MPTS, $HAuCl_4$, THF and Au NCs under excitation at 440 nm.

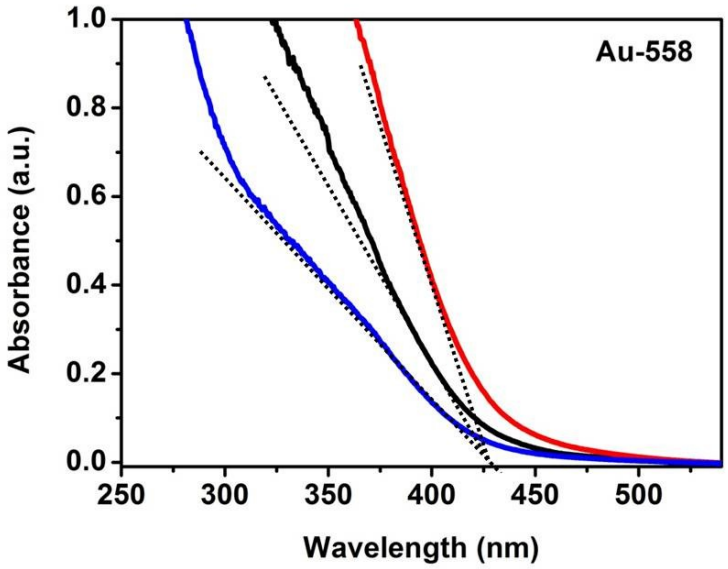

Figure S4. UV-vis absorption spectra of Au-558 recorded at different concentrations of Au-558 in THF.

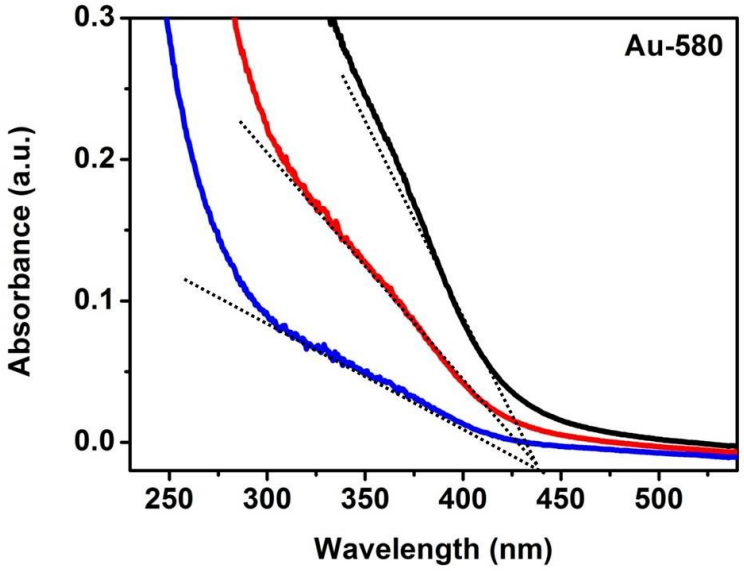

Figure S5. UV-vis absorption spectra of Au-580 recorded at different concentrations of Au-580 in THF

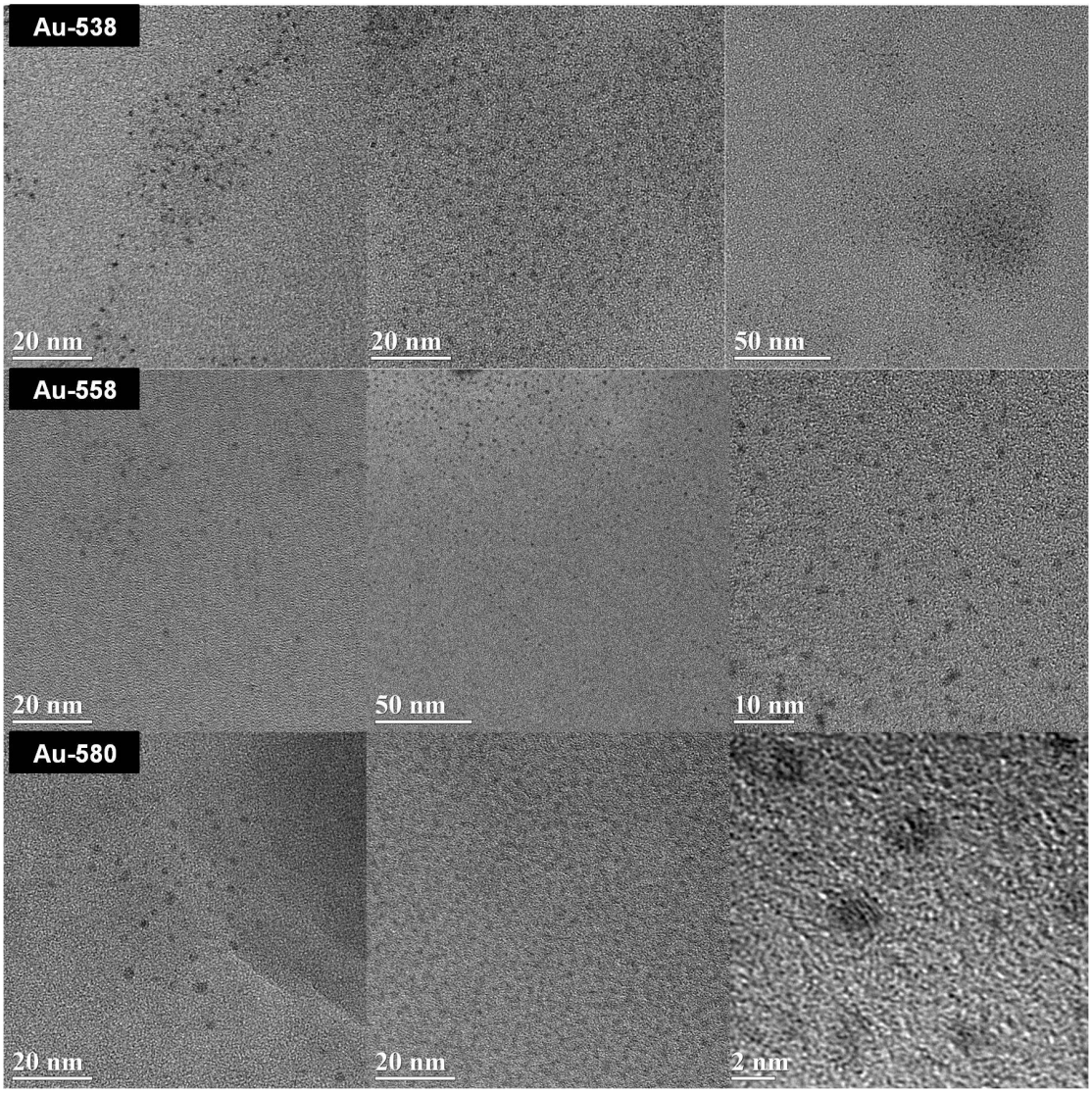

Figure S6. HR-TEM images of Au-538 (up), 558 (middle) and 580 (down) in different scale bars.

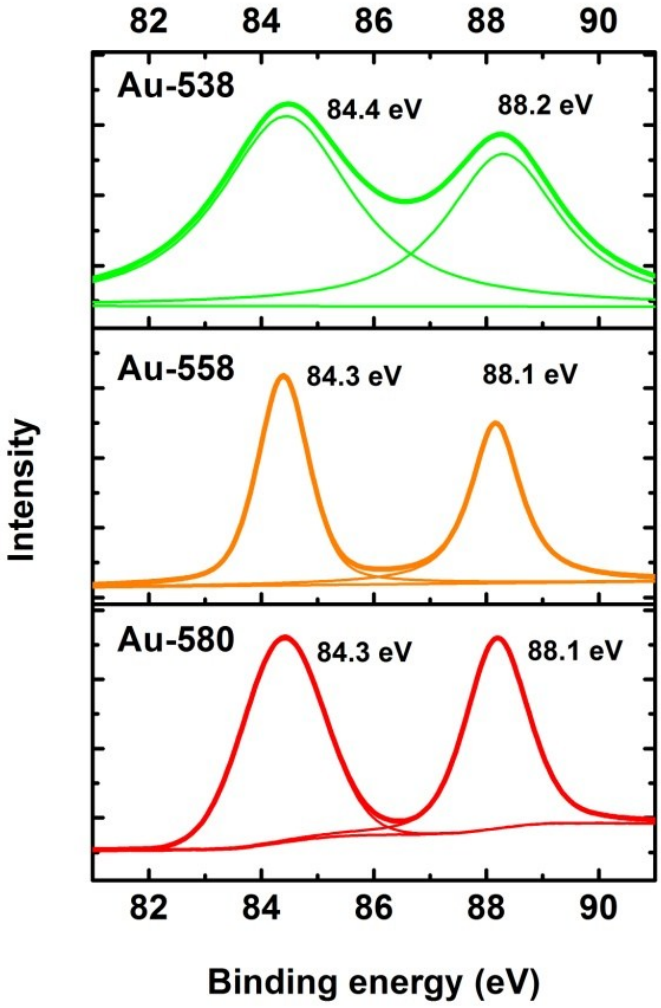

Figure S7. XPS spectra of Au 4f from Au-538,558 and 580. Binding energies of Au 4f from these samples are generally around 84.3 eV for Au $4f_{7/2}$, and 88.1 eV for $4f_{5/2}$.

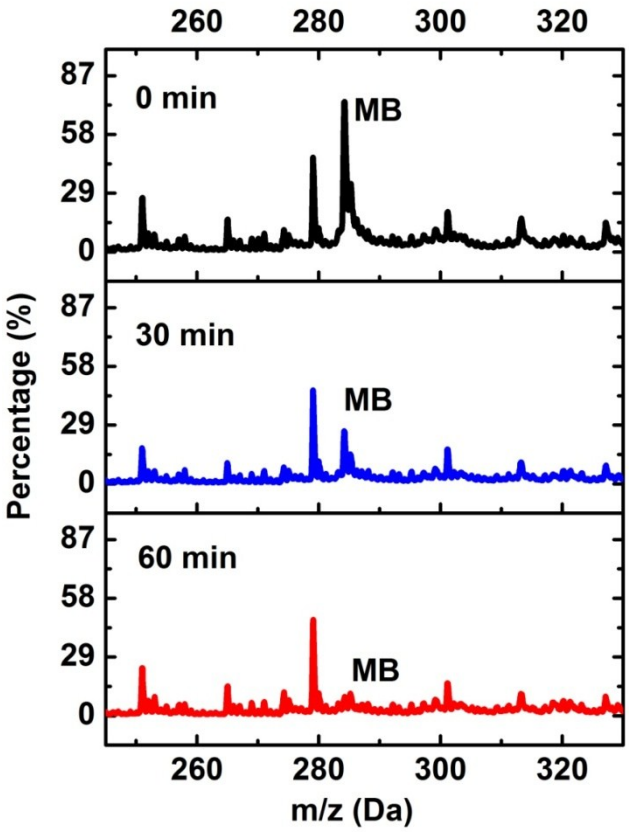

Figure S8. ESI-MS spectra of Au NCs-MB system after UV irradiation of 0, 30 and 60 minutes, respectively.

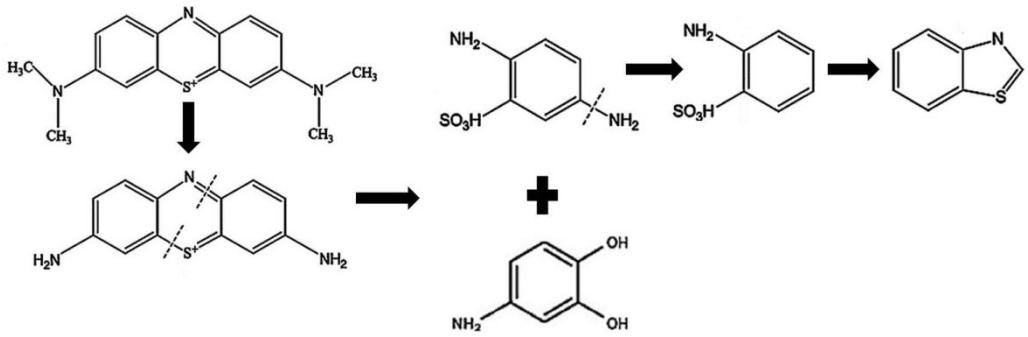

Figure S9. Possible degrading process of MB in the presence of Au NCs according to the ESI-MS results.

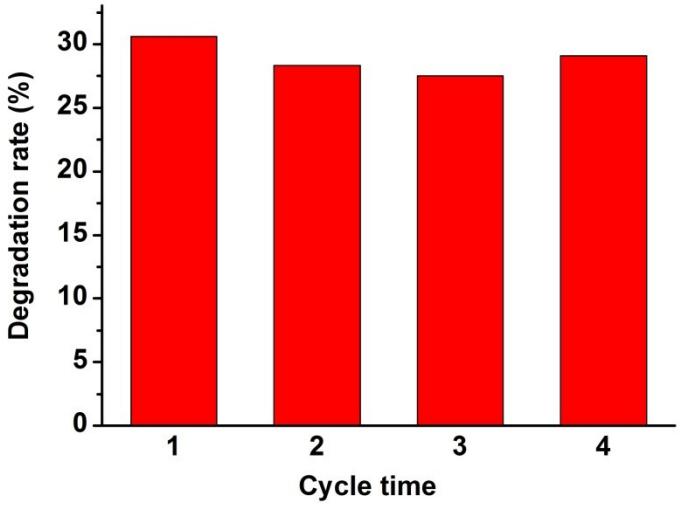

Figure S10. Cyclic test of Au NCs@glass's catalytic performance in degradation of MB under visible light.

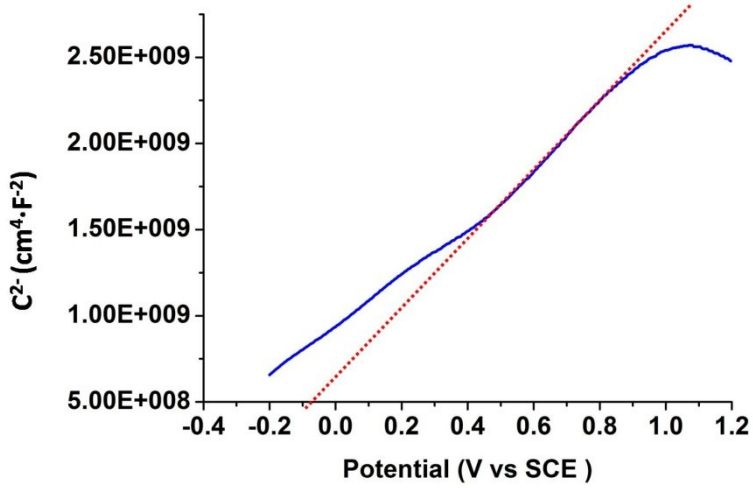

Figure S11. Mott-Schottky plots of Au NCs using saturated calomel electrode (SCE) as the reference. The intercept of tangent line at the potential axis is approximately $0.8V_{SCE}$, which equals to 0.161 V with respect to standard hydrogen electrode.

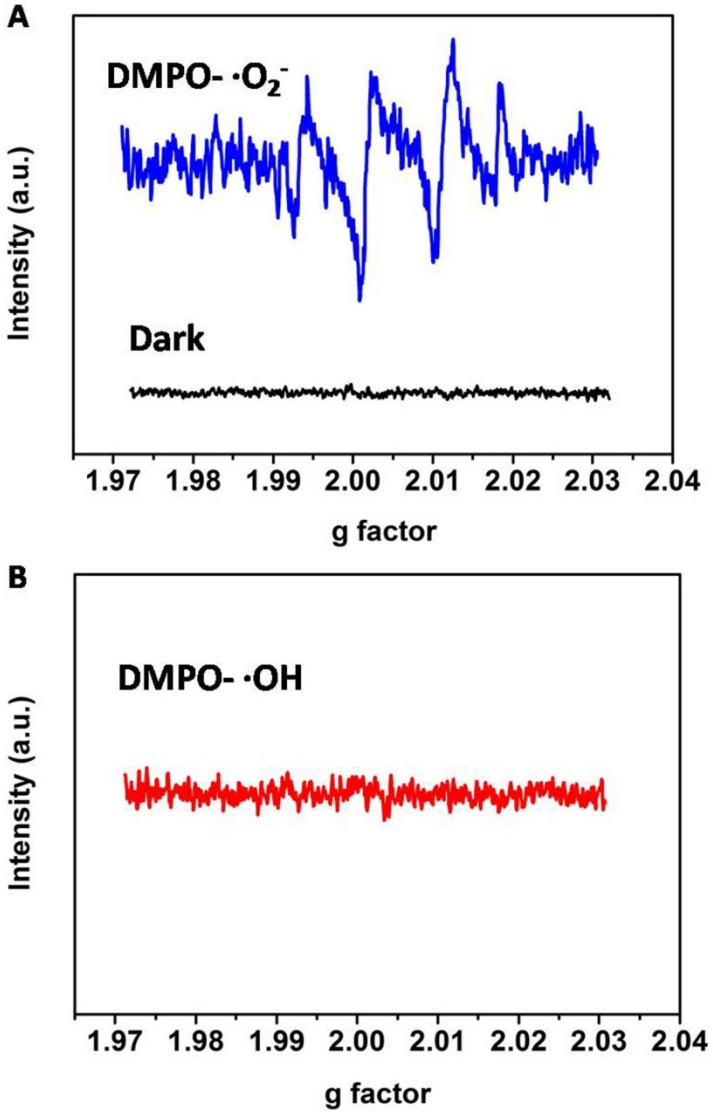

Figure S12. EPR results of the Au NCs-MB system. (A) Signal of superoxide radicals can be detected (blue line) under visible light irradiation ($\lambda > 420$ nm), and there is no signal at all in the dark environment (black line) (B) Signals of hydroxyl radicals cannot be observed.

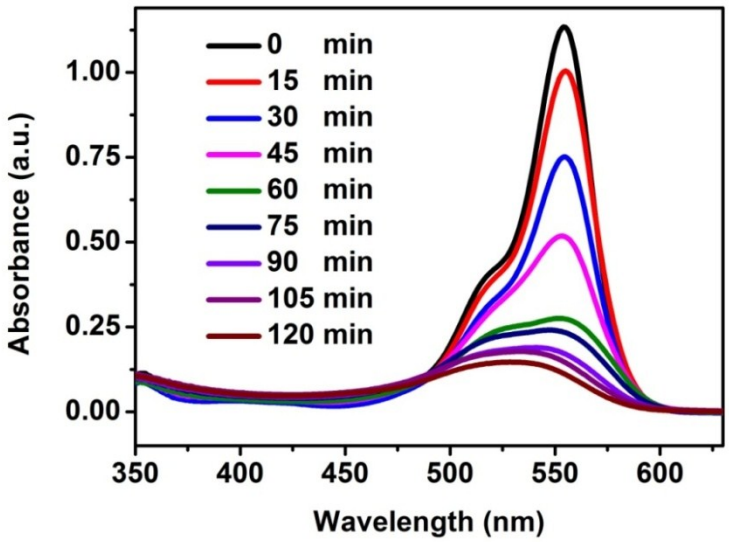

Figure S13. Degradation of Rhd B with Au NCs in water under visible light irradiation.