Supporting Information

Hemoglobin-stabilized gold nanoclusters displaying oxygen transport ability, self-antioxidant, auto-fluorescent properties and long-term storage potential

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Synthesis and Characterization of Bovine Serum Albumin (BSA)-Stabilized Gold Nanoclusters (BSA@AuNCs)

BSA@AuNCs was synthesized as previously reported.[1] Briefly, the aqueous solution of $HAuCl_4 \cdot 3H_2O$ (2.5 mL, 10 mM, 37 °C) was added to BSA solution (2.5 mL, 50 mg mL^{-1}, 37 °C) followed by stirring at 480 rpm, 37 °C for two minutes. Next, NaOH solution (0.25 mL, 1M, 37 °C) was introduced to the above reaction and vigorously stirred (480 rpm) for 12 h at 37 °C in a dark environment. Then the BSA@AuNCs were obtained and stored at 4 °C in the dark for future use.

The hydrodynamic size and polydispersity of BSA@AuNCs were measured with Malvern Zetasizer Nanoseries nano-ZS. The fluorescence spectra of BSA@AuNCs were recorded with a Tecan multimode microplate reader.

Sample Name	Diameter (nm)	ζ-Potential (mV)
BSA	4.2 ± 0.11	-6.8 ± 0.71
BSA@AuNCs	4.8 ± 0.25	-26.6 ± 2.28

Table S1. Size and zeta (ζ)-potential of free BSA and BSA@AuNCs.

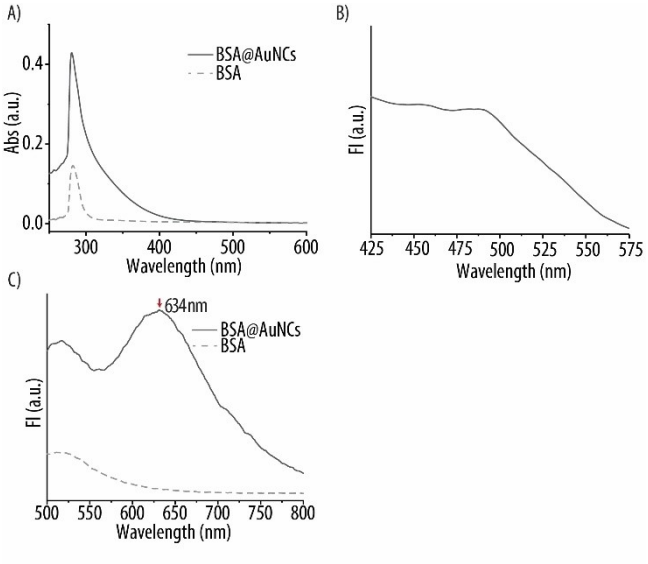

Figure S1. Characterization of BSA@AuNCs. A) UV-vis absorbance (Abs) spectra of BSA and BSA@AuNCs. B) Fluorescence intensity (FI) excitation spectrum of BSA@AuNCs. C) FI emission spectra of BSA and BSA@AuNCs when excited at 450 nm.

Conformers	Area (%)		Position (cm^{-1})	
	Hb	Hb@AuNCs	Hb	Hb@AuNCs
Intermolecular aggregates	6.0	7.5	1618.3	1618.4
β-Sheet	15.5	23.4	1630.1	1629.6
Random coils	25.3	28.4	1643.0	1641.1
α-Helix	30.1	20.6	1655.4	1653.3
β-Turns	15.3	13.8	1668.4	1665.5
Intramolecular aggregates	7.7	6.3	1682.1	1678.9, 1692.0

Table S2. Fitting parameters using a PeakFit software fitting technique of the Amide-I band for Hb and Hb@AuNCs.

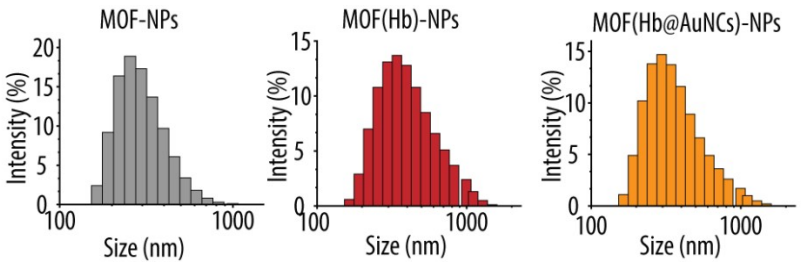

Figure S2. Size distribution of bare MOF-NPs, Hb-loaded MOF-NPs (MOF(Hb)-NPs) and Hb@AuNCs-loaded MOF-NPs (MOF(Hb@AuNCs)-NPs).

Z	Element	Family	Atomic Fraction (%)	Mass Fraction (%)
6	C	K	62.67	52.63
7	N	K	13.02	12.75
8	O	K	10.78	12.05
9	F	K	7.08	9.40
13	Al	K	6.11	11.53
14	Si	K	0.19	0.37
26	Fe	K	0.09	0.37
79	Au	L	0.06	0.89

Table S3. Energy dispersive X-ray quantification of the elements in MOF(Hb@AuNCs)-NP.

References

1. J. Xie, Y. Zheng and J. Y. Ying, *J. Am. Chem. Soc.*, 2009, **131**, 888–889.