

**Supporting Information for**  
**Multifunctional nanoparticle-protein conjugates with controllable**  
**bioactivity and pH responsiveness**

Feng Liu,<sup>‡a</sup> Lulu Xue,<sup>‡a</sup> Yuqi Yuan,<sup>a</sup> Jingjing Pan,<sup>a</sup> Chenjie Zhang,<sup>a</sup> Hongwei Wang,<sup>\*a</sup>

John L. Brash,<sup>b</sup> Lin Yuan,<sup>\*a</sup> and Hong Chen<sup>a</sup>

<sup>a</sup> The Key Lab of Health Chemistry and Molecular Diagnosis of Suzhou, College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Suzhou 215123, P. R. China. E-mail: wanghw@suda.edu.cn.; yuanl@suda.edu.cn.

<sup>b</sup> School of Biomedical Engineering, Department of Chemical Engineering, McMaster University, Hamilton, Ontario Canada.

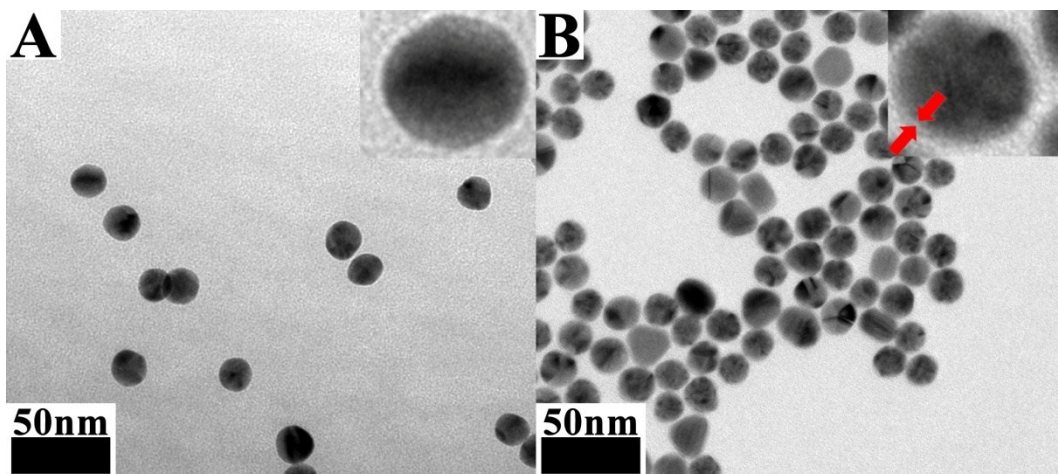
<sup>‡</sup>These authors contributed equally to this work.

**Table S1.** The GPC data for PMAA-SH.

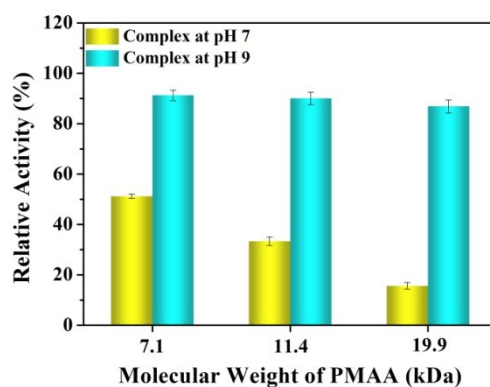
Samples	[M] <sub>0</sub> /[CTA] <sub>0</sub> /[I] <sub>0</sub>	Mn, by GPC	PDI
1	200/1/0.25	7100	1.11
2	200/1/0.25	11400	1.14
3	300/1/0.25	19900	1.12

**Table S2.** The GPC data for PDMAEMA.

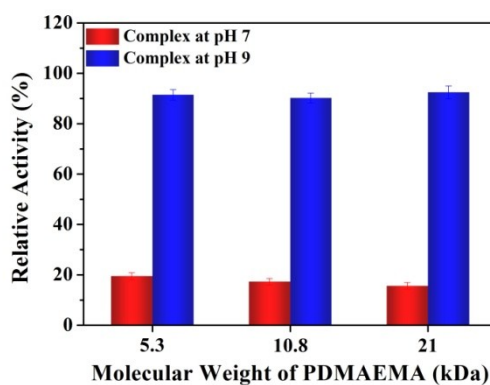
Samples	[M] <sub>0</sub> /[CTA] <sub>0</sub> /[I] <sub>0</sub>	Mn, by GPC	PDI
1	200/1/0.5	5300	1.12
2	200/1/0.5	10800	1.17
3	300/1/0.5	21000	1.25



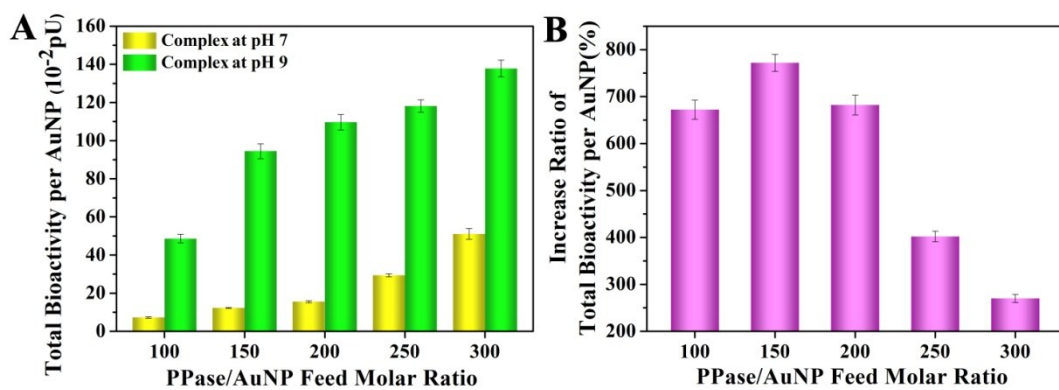
**Fig. S1** Morphology and size of: (A) AuNPs in aqueous suspension and (B) AuNP-PPase-PMAA. The layer between the red arrows is the PPase and PMAA bound to AuNPs.



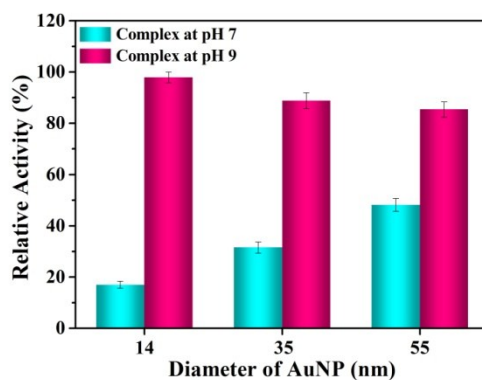
**Fig. S2** Relative specific activity of AuNP-PPase-PMAA/PDMAEMA complex (compared with the AuNP-PPase) with different molecular weights of PMAA ( $\pm$ SD, n = 3).



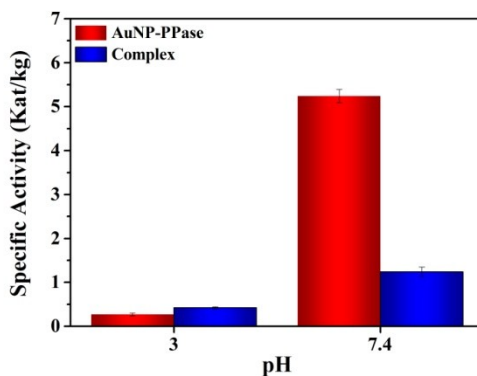
**Fig. S3** Relative specific activity of AuNP-PPase-PMAA/PDMAEMA complex (compared with the AuNP-PPase) with different molecular weights of PDMAEMA ( $\pm$ SD, n = 3).



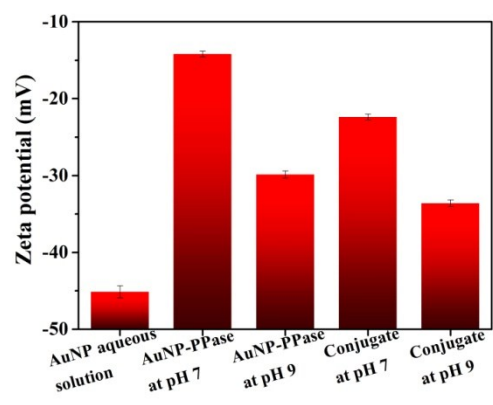
**Fig. S4** (A) Total bioactivity of AuNP-PPase-PMMA/PDMAEMA complex with different PPase/AuNP molar ratios at pH 9 and pH 7 ( $\pm$ SD, n = 3); (B) increased relative activity of the complex at pH 9 compared to pH 7 with different PPase/AuNP molar ratios ( $\pm$ SD, n =3).



**Fig. S5** Relative specific activity of AuNP-PPase-PMMA/PDMAEMA complex (compared with the AuNP-PPase) with different particle size ( $\pm$ SD, n = 3).



**Fig. S6** Specific activity of AuNP-PPase and AuNP-PPase-PMMA/PDMAEMA complex at pH 3 and 7.4 ( $\pm$ SD, n = 3).



**Fig. S7** Zeta potential of AuNP aqueous solution, AuNP-PPase, AuNP-PPase-PMAA conjugates at pH at 7 and 9 ( $\pm$ SD, n = 3).