Supporting Information for

A new strategy for reversible modulation of protein activity through site-specific conjugation of small molecule and polymer

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Figure S1. DNA sequencing results of the *E. coli* WT-*ppa* gene and mutant *ppa* gene. (nucleotides in the frame represent mutations).

Table S1. Metal ion selectivity of the PP and PPC.

Metal ions	Relative activity (%)	
	PP	PPC
Mg^{2+}	100.00±2.17	100.00±3.28
Mn^{2+}	4.75±1.55	0.47±1.16
Co^{2+}	0.76±1.63	0.87±0.64
Zn^{2+}	0.39±1.12	0.86±1.04
Ca^{2+}	2.91±2.06	2.78±1.86
Ni^{2+}	0.63±0.98	0.09±0.77
Cu^{2+}	1.00±1.26	0.06±0.75

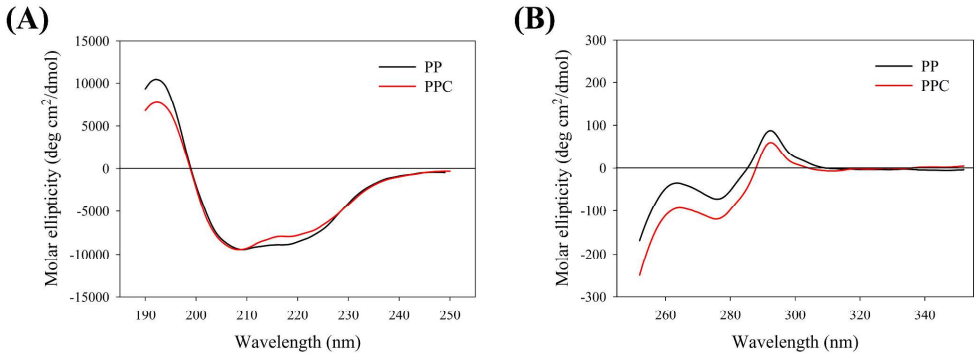

Figure S2. CD spectra in the near ultraviolet region (A) and far ultraviolet region (B) of the PP and PPC.

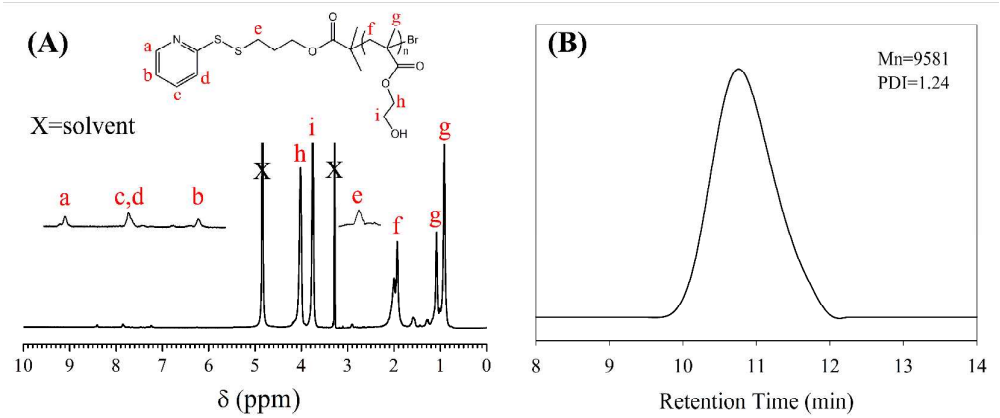

Figure S3. ^{1}H NMR spectrum (A) (in CD_3OD) and GPC trace (B) of the pyridyl disulfide-functionalized pHEMA.

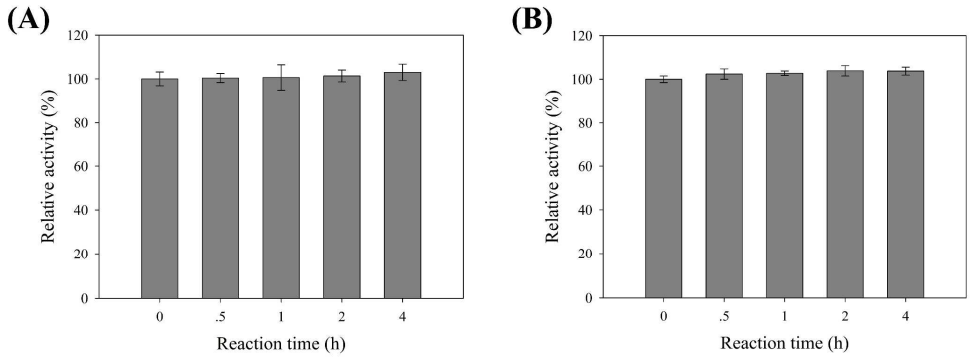

Figure S4. The influence of 8 mM cysteine on the PPi hydrolysis activity of the PP (A) and PPC (B). Here, a relative activity of 100% corresponds to the activity of PP and PPC without treatment respectively. Each column represents the mean of separate

experiments with bar as SE (n = 3).

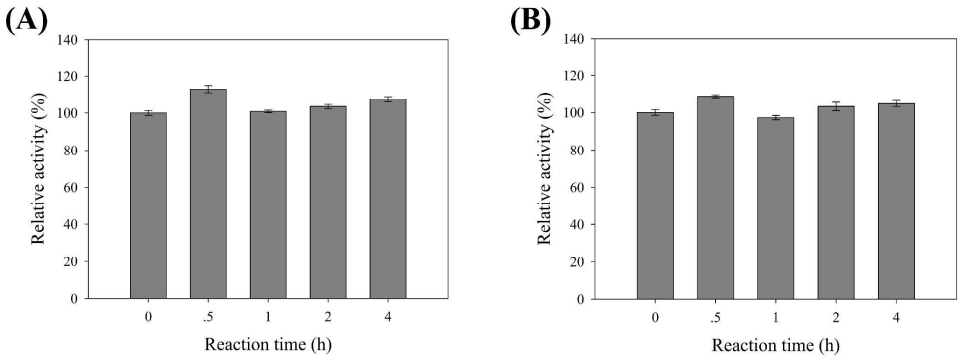

Figure S5. The influence of 8 mM DTT on the PPi hydrolysis activity of the PP (A) and PPC (B). Here, a relative activity of 100% corresponds to the activity of PP and PPC without treatment respectively. Each column represents the mean of separate experiments with bar as SE (n = 3).

Table S2. The effect of pHEMA with different molecular weights on PPC activity. The relative activity of 100 corresponds to the activity of the PPC without treatment.

Relative activity (%)	PPC	PPC-pHEMA	Reduced PPC-pHEMA
PPC-pHEMA1[a]	100.00±1.31	0.37±0.01	102.64±1.85
PPC-pHEMA2[b]	100.00±1.09	0.33±0.02	101.08±0.64

[a] pHEMA1: $M_{n,HNMR}$=8019, PDI=1.24; [b] pHEMA2: $M_{n,HNMR}$=25049, PDI=1.31.

Table S3. Michaelis-Menten parameters of sodium pyrophosphate hydrolysis catalyzed by PPC, the conjugated products and reduced products.

Michaelis-Menten parameters	PPC	PPC-PCMB	Reduced PPC-PCMB	PPC-pHEMA	Reduced PPC-pHEMA
K_M (mM)	1.08	1.10	1.12	0.90	1.06
k_{cat} (s^{-1})	377.7	68.3	335.4	10.4	329.4
k_{cat}/K_M ($mM^{-1}\cdot s^{-1}$)	351.1	62.3	300.0	11.6	312.1