Supporting Information for

A facile enzyme immobilization strategy with high stable hierarchically porous metal-organic frameworks

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Chemical transformation in detection process based on enzymes

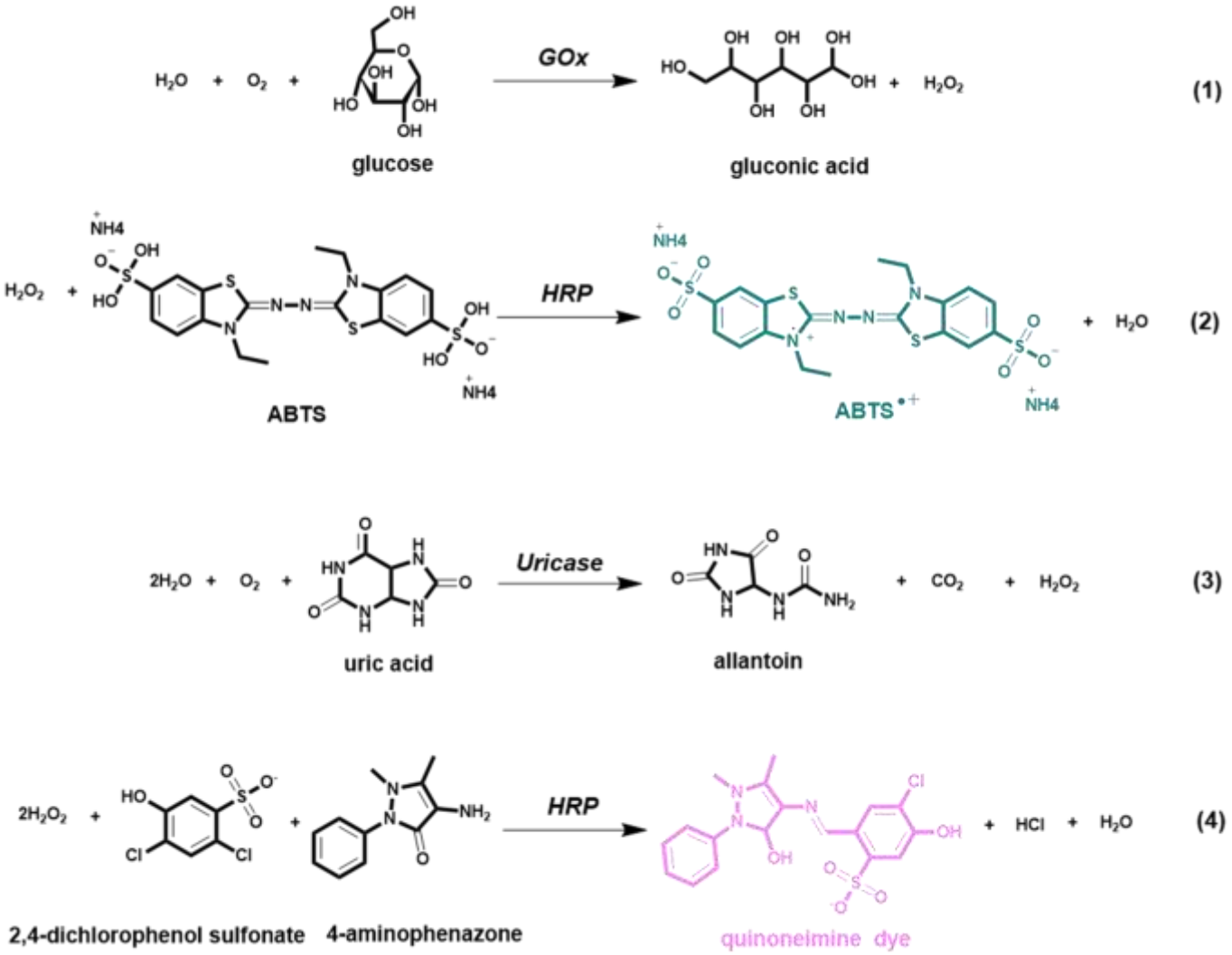

Table S1. Summary of MOF–enzyme composites and their enzyme loading.

MOFs	Enzyme	Enzyme loading per MOF (w/w)	Immobilization method	Ref.
CYCU-4	Trypsin- FTIC	55.2 mg/g	Surface attachment	[1]
UiO-66	Trypsin	80 mg/g	Surface attachment	[2]
Tb-TATB meso-MOF	Microperoxidase	19.1 μmol/g	Pore encapsulation	[3]
Tb-TATB meso-MOF	Cytochrome C	10.2 μmol/g	Pore encapsulation	[4]
IRMOF-3	Lipase	0.18 mg/g	Covalent linkage	[5]
UiO-66-NH_2	SEH	87.3 mg/g	Covalent linkage	[6]
ZIF-8	Lipase	72.2 mg/g	Co-precipitation	[7]
ZIF-8	Cytochrome C	80 mg/g	Co-precipitation	[8]
ZIF-90	Catalase	50 mg/g	Co-precipitation	[9]

Table S2. Immobilization capacity of uricase for HP-DUT-5 prepared under different molar ratio of dodecanoic acid.

Sample	dodecanoic acid/metal [molar ratio]	Uricase capacity [mg/g]
DUT-5	0	31
HP-DUT-5(10)	10	128
HP-DUT-5(20)	20	225
HP-DUT-5(35)	35	96
HP-DUT-5(50)	50	-
HP-UiO-66	20	46

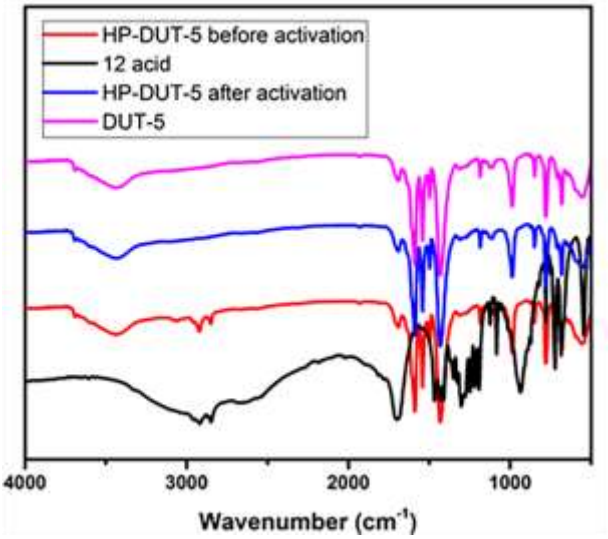

Figure S1. FTIR spectra of DUT-5, dodecanoic acid and HP-DUT-5 before and after activation.

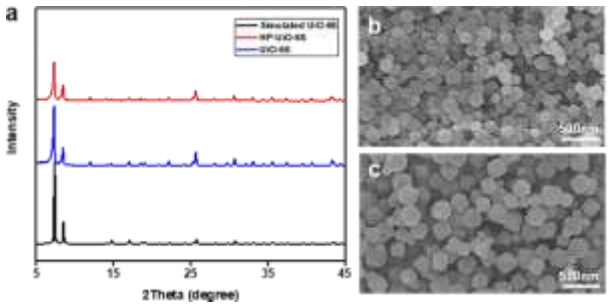

Figure S2. (a) Powder X-ray diffraction patterns of UiO-66 and HP-UiO-66; SEM images of (b) HP-UiO-66 and (c) UiO-66.

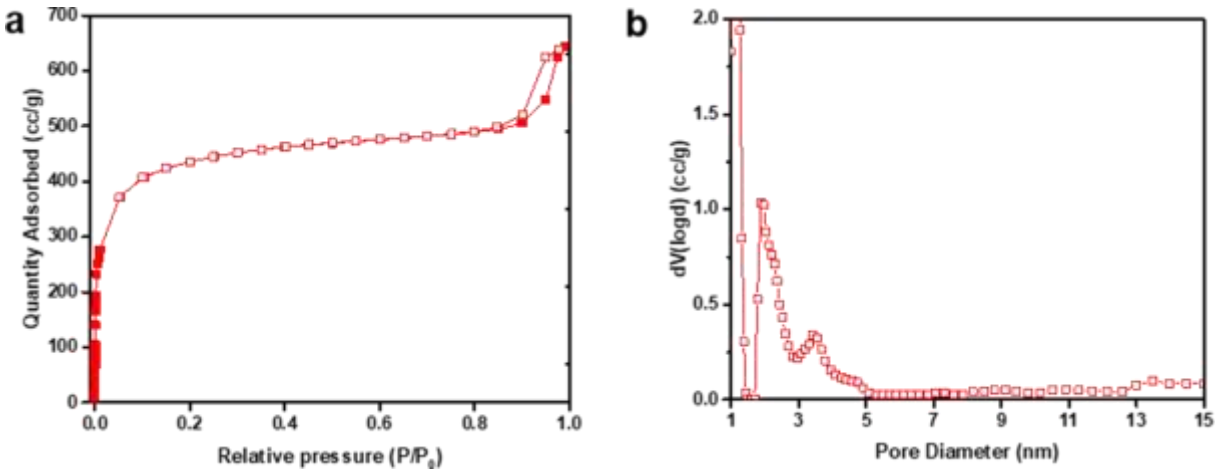

Figure S3. (a) N_2 sorption isotherms and (b) DFT pore size distributions for HP-UiO-66.

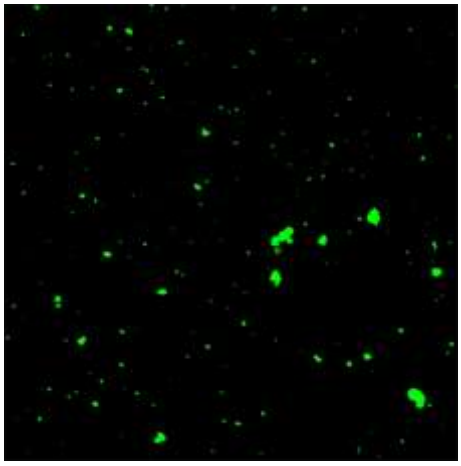

Figure S4. Confocal laser scanning microscopy images of FITC-Uricase@HP-DUT-5.

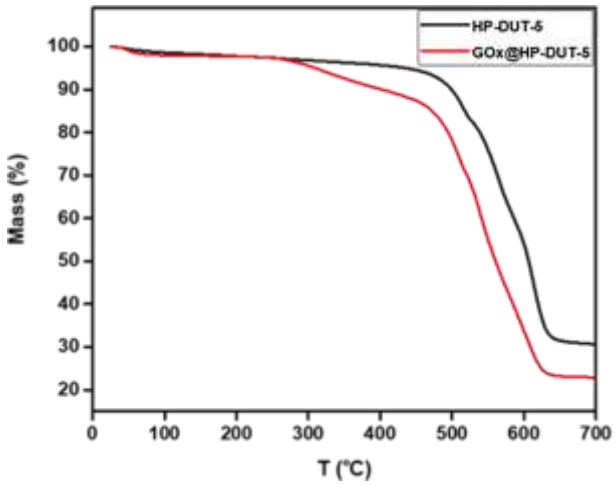

Figure S5. TGA analysis of HP-DUT-5 and GOx@HP-DUT-5.

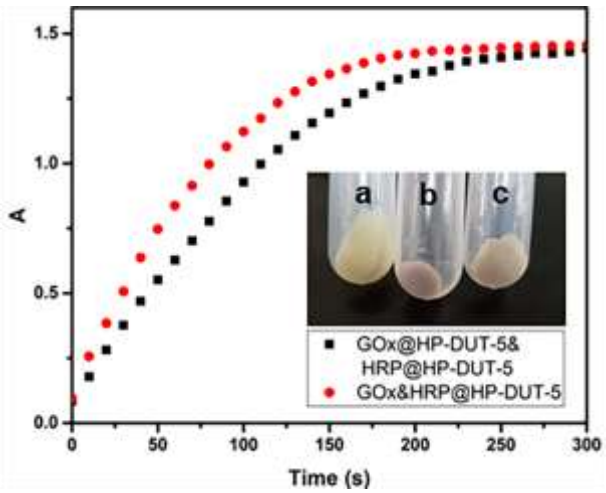

Figure S6. Kinetic plots of time-dependent absorbance intensity of 0.05 M NaAc-HAc buffer (pH 6.0) containing 300 μM glucose, 2 mM ABTS and 1 mg GOx&HRP@HP-DUT-5 (immobilized 0.09 mg GOx and 0.01 mg HRP) (●) or the mixture of 0.5 mg GOx@HP-DUT-5 (immobilized 0.09 mg GOx) and 0.5 mg HRP@HP-DUT-5 (immobilized 0.01 mg HRP) (■). The inset shows visual colors of (a) GOx@HP-DUT-5, (b) HRP@HP-DUT-5 and (c) GOx&HRP@HP-DUT-5.

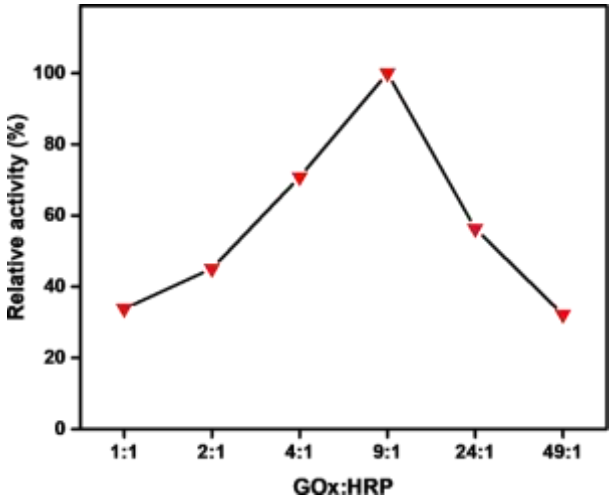

Figure S7. Catalytic activity of GOx&HRP@HP-DUT-5 with different molar ratio of GOx and HRP.

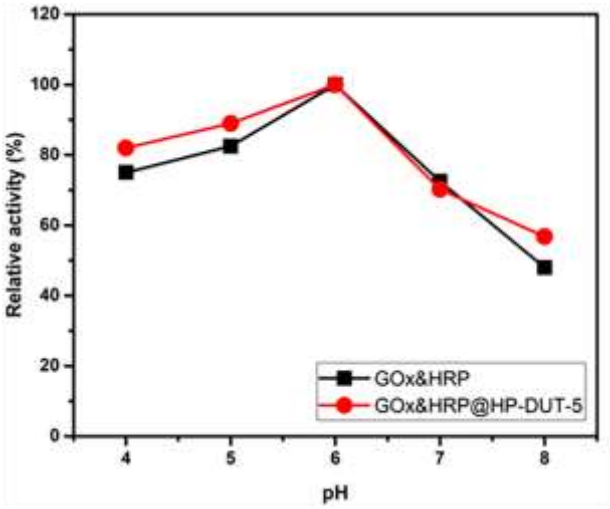

Figure S8. Catalytic activity of free GOx&HRP and GOx&HRP@HP-DUT-5 under different pH.

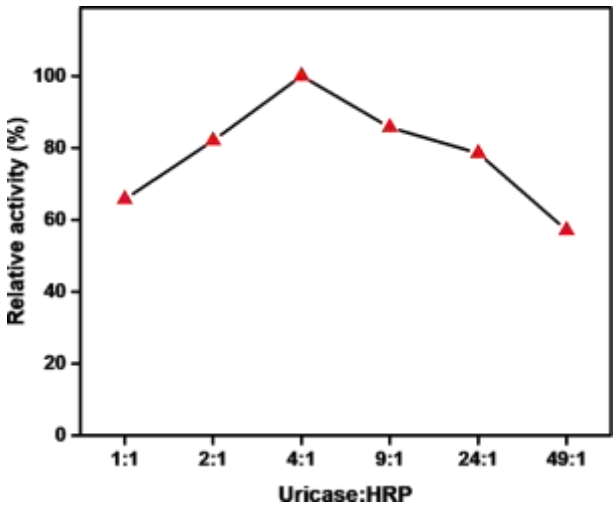

Figure S9. Catalytic activity of URICASE&HRP@HP-DUT-5 with different molar ratio of uricase and HRP.

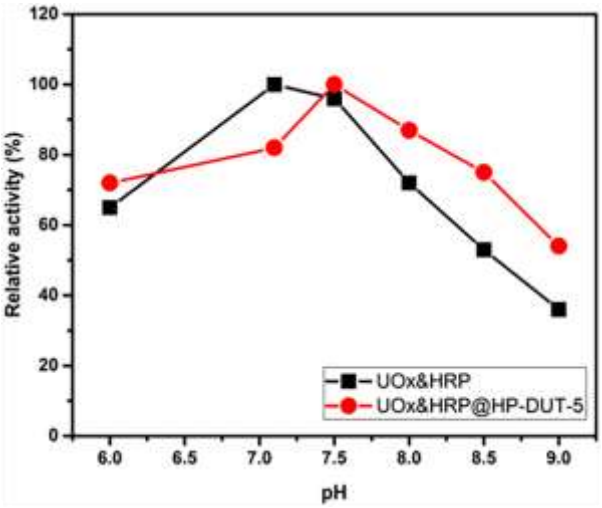

Figure S10. Catalytic activity of free Uricase&HRP and URICASE&HRP@HP-DUT-5 under different pH.

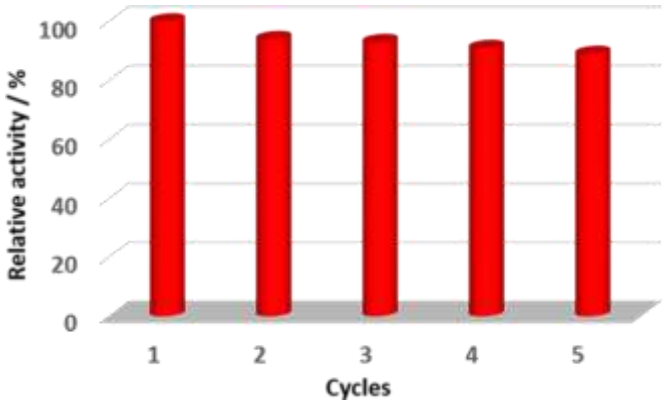

Figure S11. Reusability of the URICASE&HRP@HP-DUT-5 in the cycle catalysis of UA.

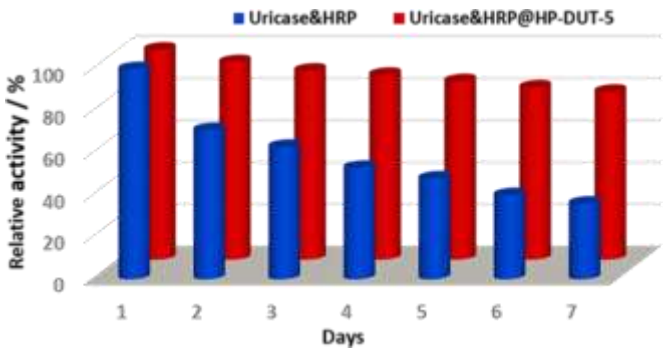

Figure S12. Storage stability under room temperature of free URICASE&HRP and URICASE&HRP@HP-DUT-5.

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