Electronic Supplementary Information (ESI) for:

Colorimetric determination of xanthine with xanthine oxidase and WSe_2 nanosheets as a peroxidase mimic

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Supporting Figures

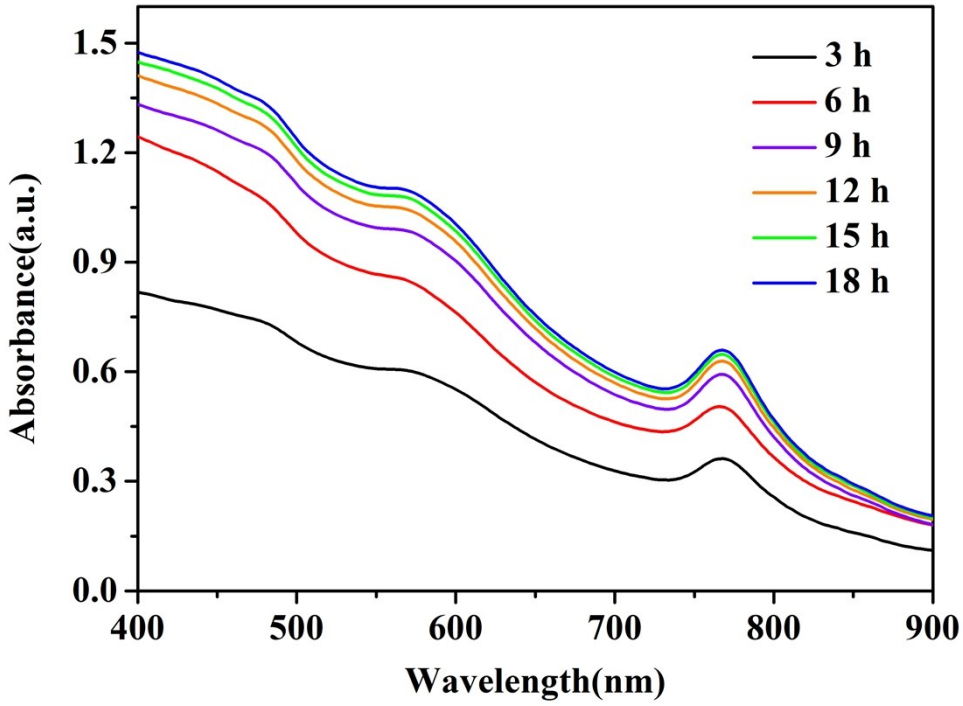

Fig. S1. The UV-Vis absorption spectra of WSe_2 nanosheets after different sonication times.

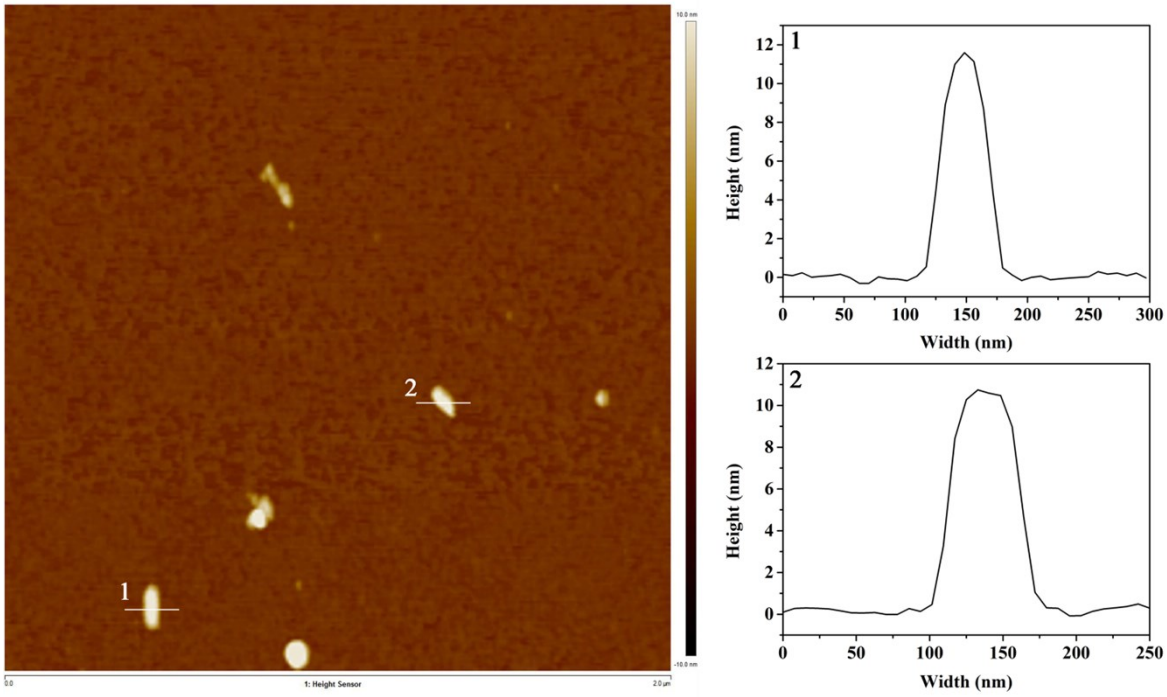

Fig. S2. The AFM image of WSe_2 nanosheets.

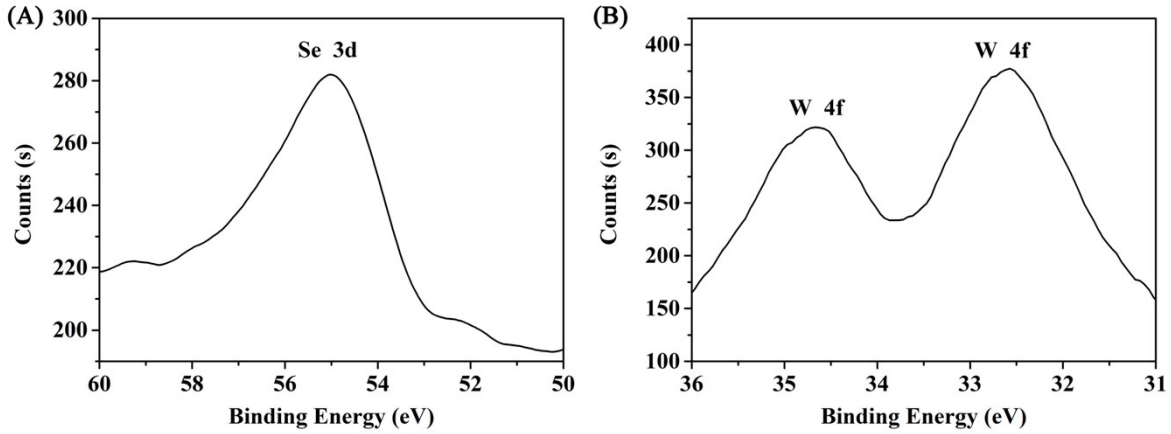

Fig. S3. The XPS spectrum of WSe_2 nanosheets.

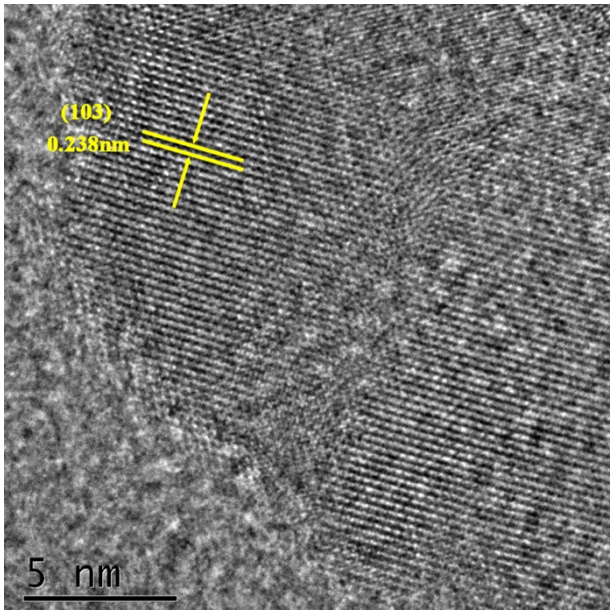

Fig. S4. The high-resolution transmission electron microscope of WSe_2 nanosheets.

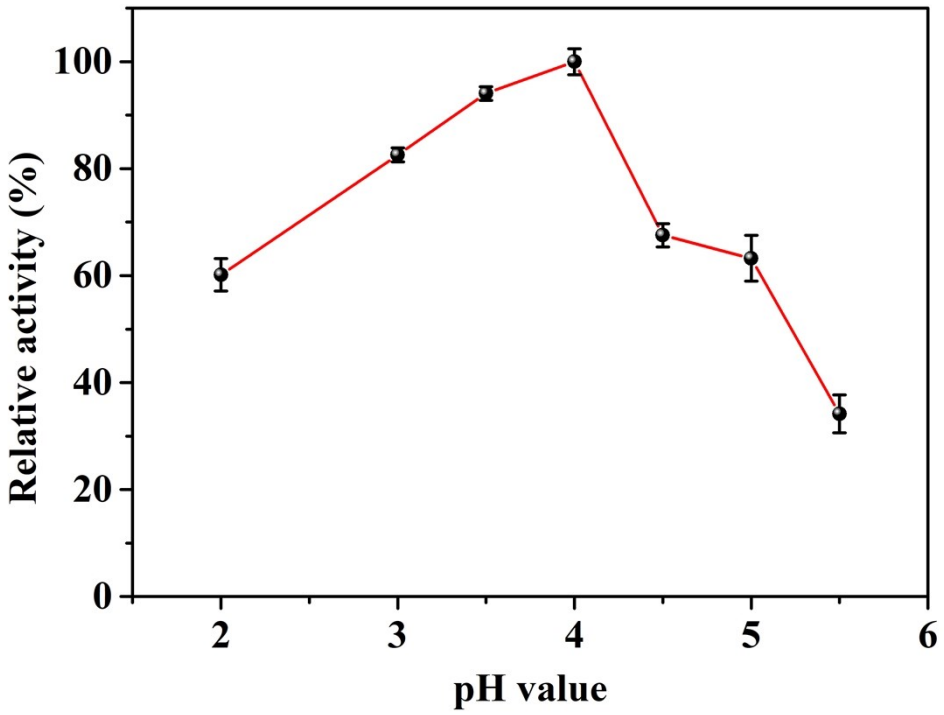

Fig. S5. Effects of pH value on relative peroxidase mimic activity of WSe_2 nanosheets. Experiments were performed using WSe_2 nanosheets (30 μg mL^{-1}) in 250 μL NaAc-HAc (0.2 M) with TMB (1 mM) as substrate.

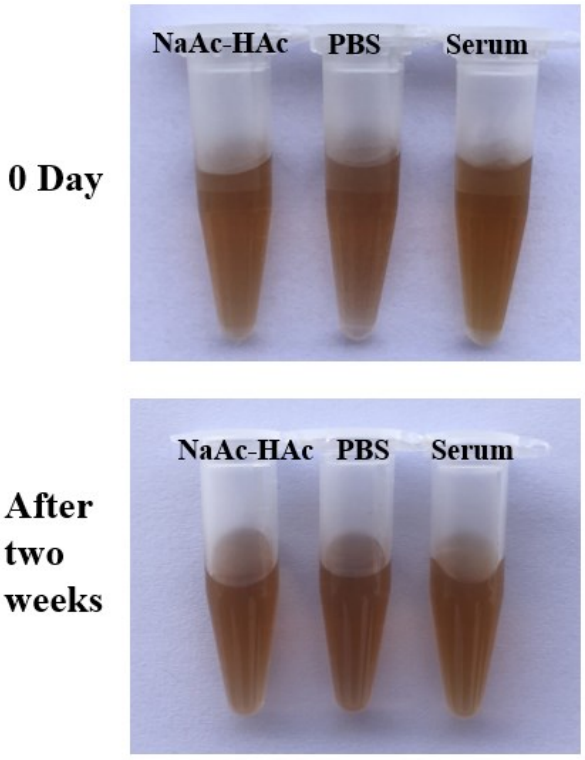

Fig. S6. Photos of WSe_2 nanosheets in NaAc-HAc buffer, PBS and serum.

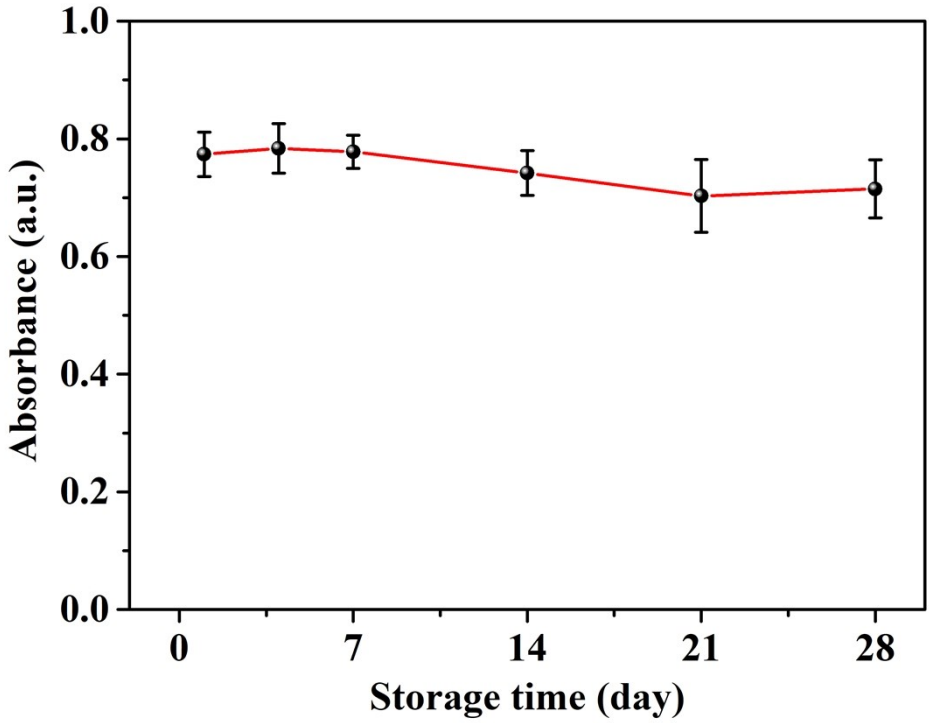

Fig. S7. The stability of enzyme mimic of WSe_2 nanosheets for xanthine detection. The concentration of xanthine was 0.5 mM.

Table S1. Comparison of kinetic parameters of WSe_2 nanosheets and other materials.

Materials	Substrate	K_m(mM)	V_{max}(10^{-8}Ms^{-1})	Ref.
HRP	TMB	0.434	10.0	1
	H_2O_2	3.70	8.71	
Pd nanoparticle	TMB	1.44	0.0024	2
	H_2O_2	42.7	0.00389	
Ir nanoparticle	TMB	0.03	0.017	3
	H_2O_2	18.02	0.081	
BSA-Au cluster	TMB	0.00253	6.23	4
	H_2O_2	25.3	7.21	
Se-g-C_3N_4 nanosheets	TMB	0.307	0.00205	5
	H_2O_2	0.298	0.00433	
WO_3 nanosheets	TMB	10.6	1.53	6
	H_2O_2	1260	3	
Rh nanosheets	TMB	0.264	12.56	7
	H_2O_2	4.51	68.09	
$MoSe_2$ nanosheets	TMB	0.014	0.56	8
	H_2O_2	0.155	0.99	
WSe_2 nanosheets	TMB	0.205	1.25	This work
	H_2O_2	0.746	0.484	

Table S2. Comparison of previous methods for determination of xanthine.

Method	Dynamic range (μM)	Linear range (μM)	LOD (μM)	Real sample	Reference
Pd nanoparticle	-	1-50	0.29	Urine	2
Ir nanoparticle	10-150	10-150	5.2	-	3
BSA-Au cluster	0-800	0.5-20	0.5	Urine、Serum	4
Se-g-C_3N_4 nanosheets	0-1600	0.16-40	0.016	Serum	5
WO_3 nanosheets	0-400	25-200	1.24	Urine	6
Rh nanosheets	0-500	2.0-80	0.73	-	7
$MoSe_2$ nanosheets	0-1200	10-320	1.964	Serum	8
WSe_2 nanosheets	0-1000	10-500	4.37	Serum	This work

References

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