Quantitative visualized detection of acetylcholinesterase activity and its inhibitor based on oxidization character of ultrathin MnO₂ nanosheets

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Fig.S1. Optimization condition of substrate concentration for AChE-MnO₂-OPD biosystem.

Fig.S2. Effects of (A) concentrations of MnO₂ nanosheets and (B) concentrations of OPD on the absorption intensity. Optimization conditions of the reaction time (C) and (D) reaction temperature for MnO₂-OPD platform.

Fig.S3. (A) Optimization reaction condition for substrate (B) Optimization reaction time

for Ellman method.

Fig.S4. The EDS spectrum of MnO₂ nanosheets.

Fig.S5. (A) Cell viability of the four compounds at 80 µM in a cytotoxicity assay.

Number	Stucture of componds	Molecular formular	Molecular Weight
HJ-1	ОН НОСОО-О-ОН ОН	$C_{12}H_{16}O_7$	272
HJ-4	HPG OH OH	$C_{13}H_{18}O_7$	286
HJ-7	H ₃ CO	$C_{10}H_{14}O_4$	198
HJ-8	н ₃ со-С-ОН	$C_{10}H_{14}O_4$	198
HJ-9		$C_{20}H_{24}O_9$	408
HJ-15	HO OH HO OH	$C_{13}H_{18}O_6$	270
HJ-19	HOH H ₃ CO HOHH ₃ CO	$C_{18}H_{26}O_7$	354
HJ-27	HO OH H_3CO OH HO OH HO OH H_3CO OH H_3CO HO HO H_3CO HO HO HO HO HO HO HO H	$C_{17}H_{24}O_9$	372
HJ-28	HO OH OH OH OH	$C_{19}H_{30}O_8$	386

Table S1 The structure of the compounds 1-13 and IC $_{\rm 50}$ value of inhibition on AChE







The absorption intensity changed under different concentrations of ATCh (0, 0.05, 0.1, 0.2, 0.5, 1.0 mM final solution).

Fig.S2.



As shown in Fig. S2A, with the increasing concentration of MnO_2 in OPD solution the absorption intensity increased. Same results showed various concentration of OPD added into MnO_2 solution (Fig. S2B). The optimization concentrations of MnO_2 and OPD for MnO_2 -OPD system were 5 μ M and 20 mM. The optimization reaction condition for time and temperature is 20 min and 80 °C (Fig. S 2C - 2D).



The absorption intensity under different concentrations of (A) ATCh (0, 0.05, 0.1, 0.2, 0.25, 0.3, 0.4, 1.0 mM final solution) and (B) Optimization reaction time with ATCh (0.5mM) and AChE (10 U/L) incubated for 0, 5, 10, 20, 30min, respectively.

Fig.S4.



Fig.S5.



Data analysis: IE was analyzed by the following equation: $IE = (F_{inhibitor} - F_{no-inhibitor})/(F_0 - F_{no-inhibitor}), in which F_{inhibitor} and F_{no-inhibitor} represent the absorbance intensity of AChE-MnO₂-OPD system and AChE-MnO₂-OPD-inhibitor system, respectively. F₀ refers to the absorbance intensity of the MnO₂-OPD system without AChE and inhibitor [1].$

. Reference

[1] Y. Zhang, T. Hei, Y. Cai, Q. Gao, Q. Zhang, Anal. Chem., 2012, 84, 2830-2836.