

## **An insight into the oxidase-mimicking activity enhancement of MnO<sub>2</sub> nanozymes by Co ion-doping for colorimetric sensor assays**

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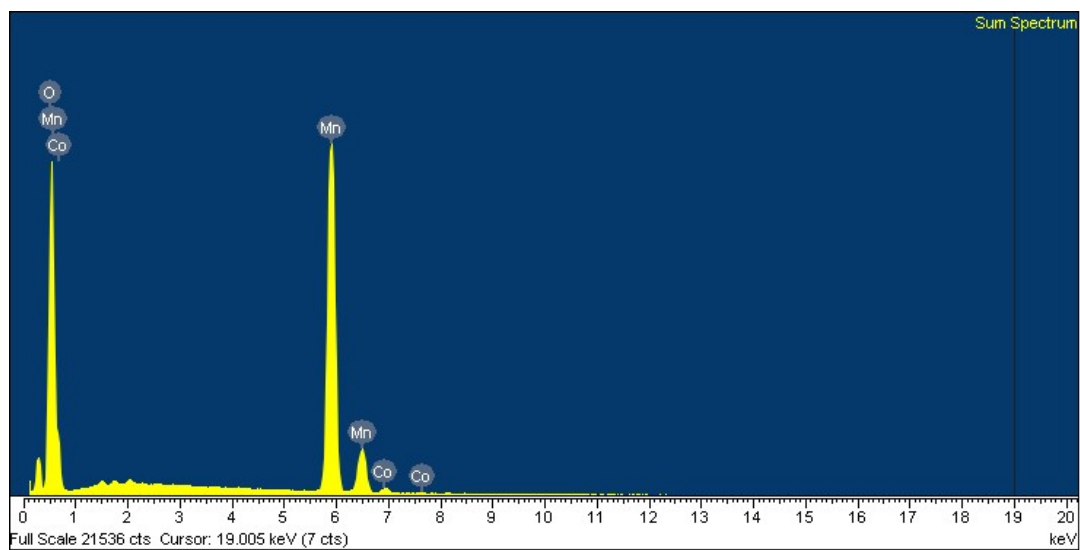


Figure S1. EDS spectrum of Co-MnO<sub>2</sub>.

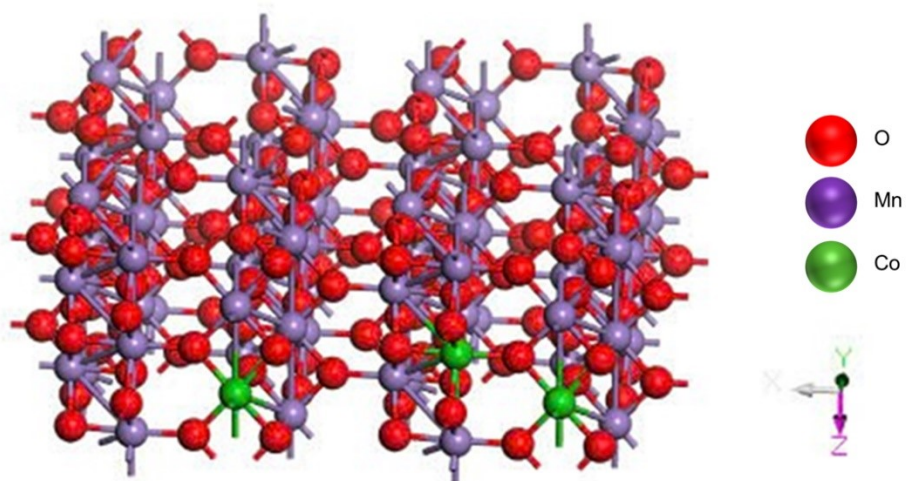


Figure S2. Simulated structure of Co-MnO<sub>2</sub> based on XRD data.

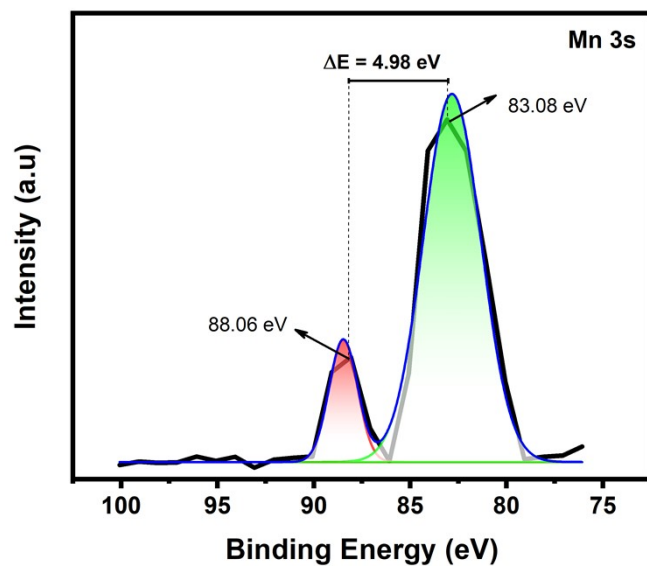


Figure S3. The high-resolution Mn 3s spectrum of Co-MnO<sub>2</sub>.

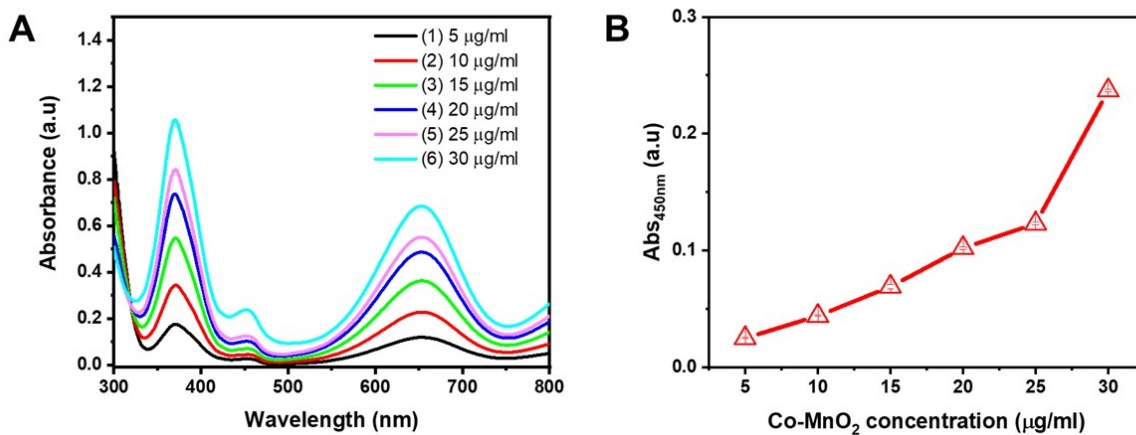


Figure S4. Absorption spectra of various concentrations of Co-MnO<sub>2</sub> and dependence of absorption intensity at 450 nm on Co-MnO<sub>2</sub> concentration.

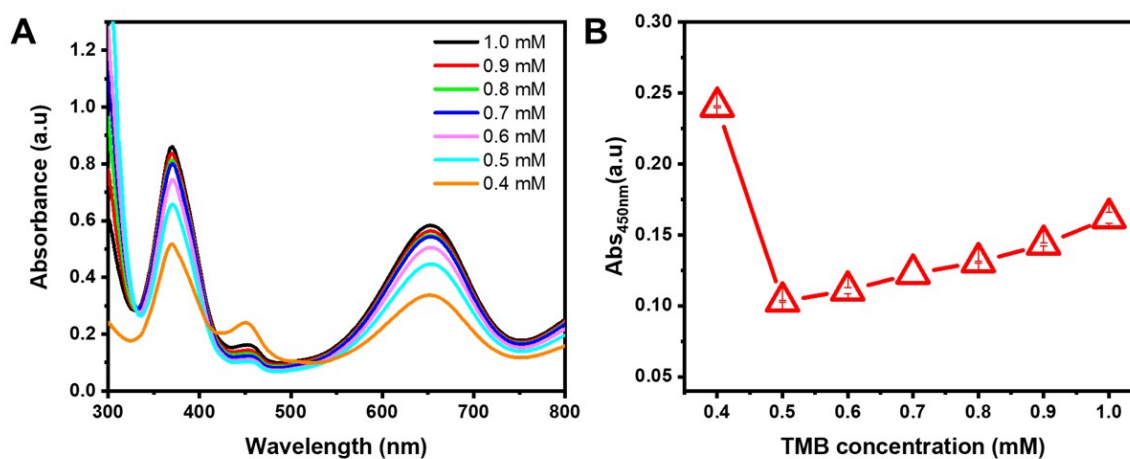


Figure S5. Absorption spectra of various concentrations of TMB and dependence of absorption intensity at 450 nm on TMB concentration.

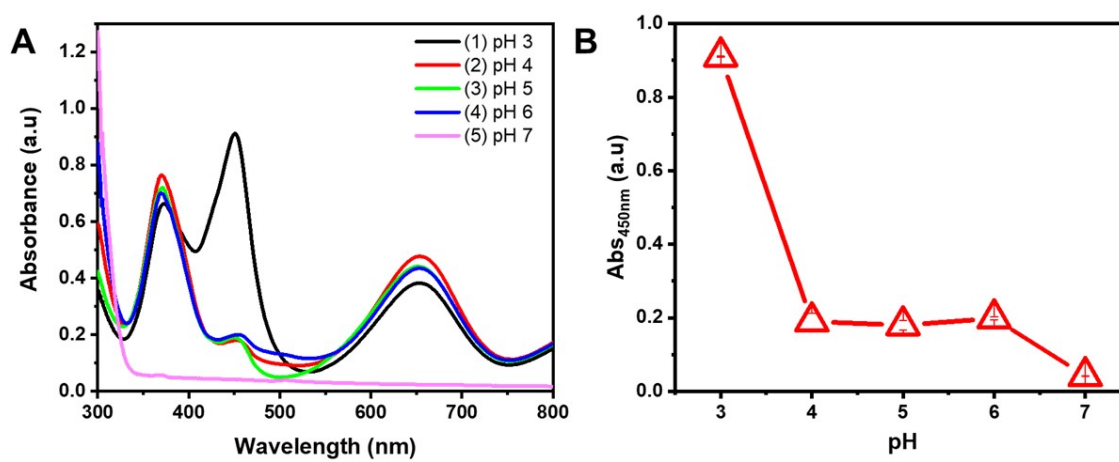


Figure S6. Absorption spectra of various pH of buffer solution and dependence of absorption intensity at 450 nm on pH.

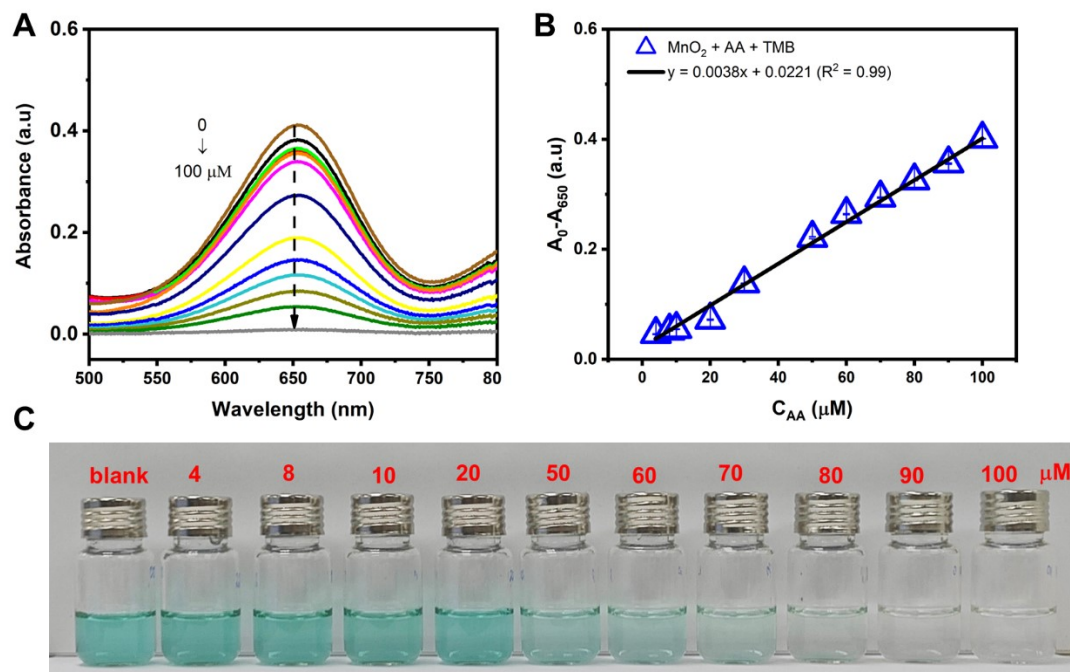


Figure S7. (A) UV-Vis spectra of  $\text{MnO}_2$  + TMB system and (B) Colorimetric detection linear correlation for AA concentrations ranging from 4 to 100  $\mu\text{M}$ . (C) Photo of vials containing  $\text{MnO}_2$  + TMB system with different AA concentrations.

Table S1: Comparison of the kinetic parameters for oxidation reaction catalyzed of  $\text{MnO}_2/\text{Co}$ -based nanozymes with TMB substance.

| Nanozyme                                       | $K_m$ (mM) | $V_{\max}$ ( $\text{Ms}^{-1}$ ) | Ref.      |
|--|------------|---------------------------------|-----------|
| $\text{MnO}_2@\text{G}$                        | 0.026      | $2.52 \times 10^{-8}$           | [1]       |
| $\text{Pt}@\text{MnO}_2$                       | 0.015      | $1.56 \times 10^{-6}$           | [2]       |
| $\text{Co(BDC)TED}_{0.5}@\text{24h}$           | 0.26       | $3.57 \times 10^{-8}$           | [3]       |
| Co NPs   | 1.14       | $9.98 \times 10^{-8}$           | [4]       |
| $\text{Fe}_{0.5}\text{Co}_{0.5}$ nanoparticles | 1.79       | $45.6 \times 10^{-8}$           | [4]       |
| $\text{MnO}_2$                                 | 1.81       | $3.88 \times 10^{-6}$           | This work |
| Co- $\text{MnO}_2$                             | 1.17       | $4.69 \times 10^{-6}$           | This work |

## Reference

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