

Electronic Supplementary Information (ESI)

Heterogeneous $\text{Co}_3\text{O}_4/\text{Bi}_2\text{O}_3$ Composite Catalyst for Oxidative Degradation of Organic Pollutants in the Presence of Peroxymonosulfate

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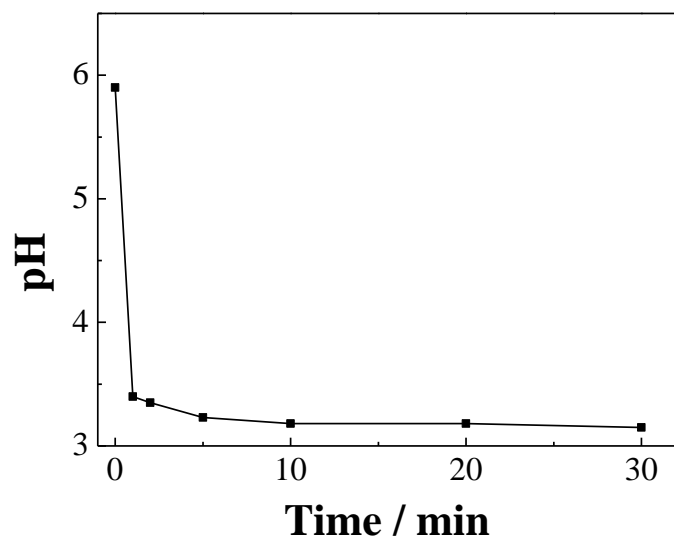


Fig. S1. Profile of solution pH during the reaction in the CBO–PMS–MB system. Reaction conditions: initial MB concentration $20 \mu\text{mol L}^{-1}$, initial PMS concentration 0.5 mmol L^{-1} and catalyst load 0.05 g L^{-1} .

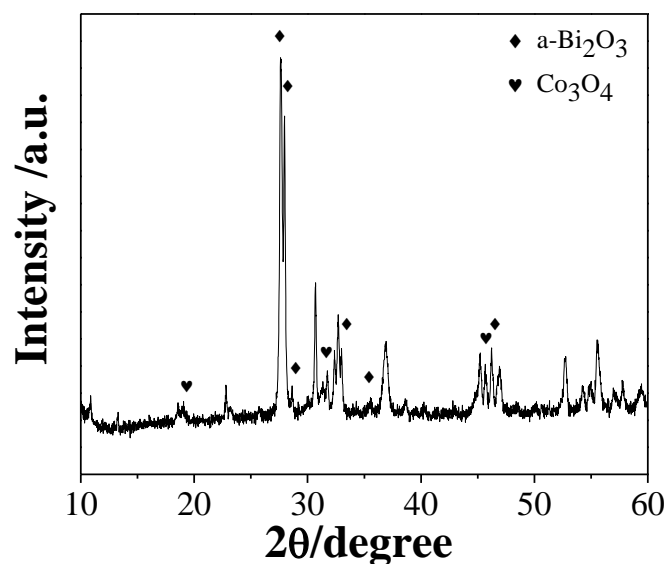


Fig. S2. XRD result of Bi₂O₃ and Co₃O₄ mixture with the molar ratio of Bi to Co at 1:1.

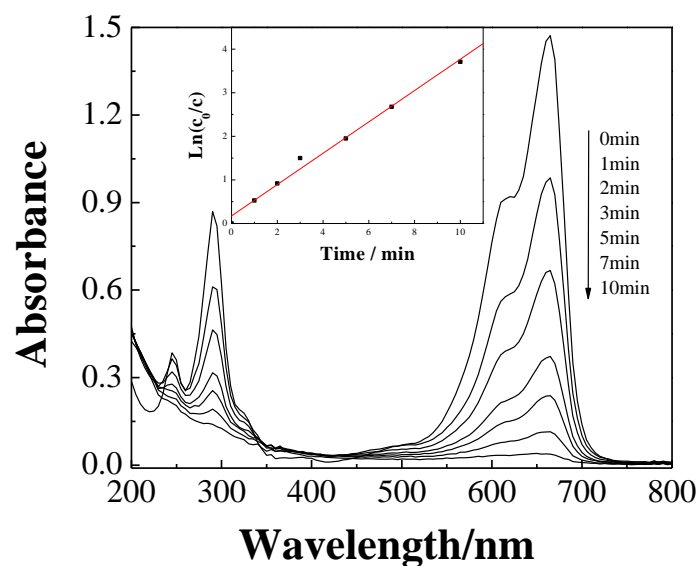


Fig. S3. UV-vis absorption spectra of MB solution in the system of CBO-PMS-MB. Reaction conditions: initial MB concentration $20 \mu\text{mol L}^{-1}$, initial PMS concentration 0.5 mmol L^{-1} and catalyst load 0.05 g L^{-1} .

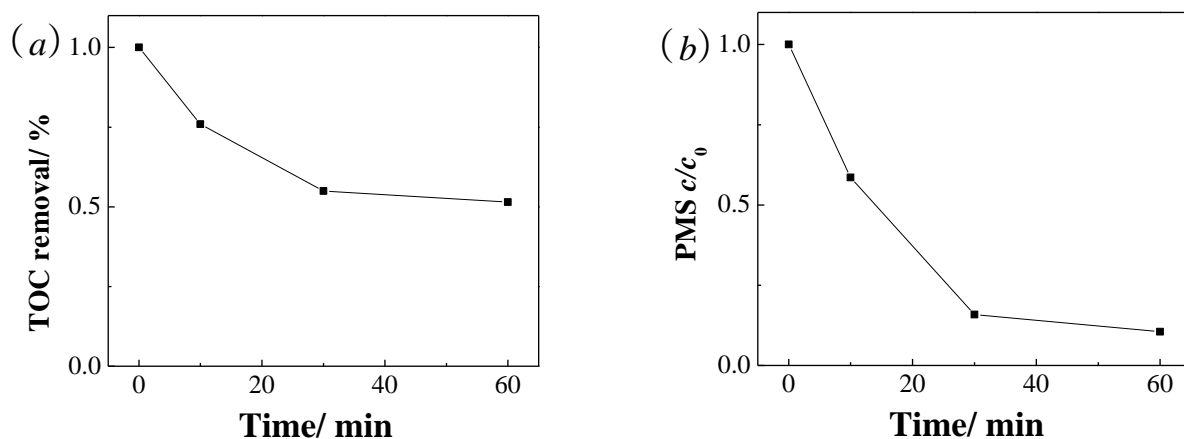
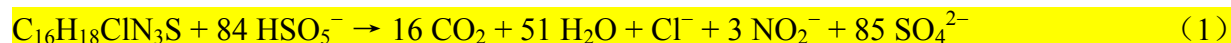


Fig. S4. (a) TOC removal and PMS consumption during the degradation of MB ($20 \mu\text{mol L}^{-1}$) in the system of CBO-PMS-MB. Reaction conditions: initial PMS concentration 1.0 mmol L^{-1} and catalyst load 0.05 g L^{-1} .

Calculation of the efficiency of utilization of PMS In stoichiometry, the complete mineralization of

one mole MB will consume 84 moles of PMS (eq. 1).



Thus, the stoichiometry efficiency of utilization of PMS (η) is defined as the ratio of the amount of

PMS used for the degradation of MB ($\Delta[\text{PMS}]_{\text{degradation}}$) with the total amount of the consumed PMS

($\Delta[\text{PMS}]_{\text{decomposition}}$) in the reaction, according to eq. 2:

$$\eta = \Delta[\text{PMS}]_{\text{degradation}} / \square \Delta[\text{PMS}]_{\text{decomposition}} \quad (2)$$

In CBO-PMS-MB system, the TOC removal was 49% after 1 h reaction, as given in the text (Figure S4(a)). Therefore, we can have the amount of MB being equivalent to the amount of completely mineralized MB, and then we can calculate the value of $\Delta[\text{PMS}]_{\text{degradation}}$ according to equation (1). The value of $\Delta[\text{PMS}]_{\text{decomposition}}$ at different reaction time was measured as shown in Figure S4(b). Therefore, the efficiency of the utilization of PMS was calculated as 91% for the catalysts of CBO catalyst.

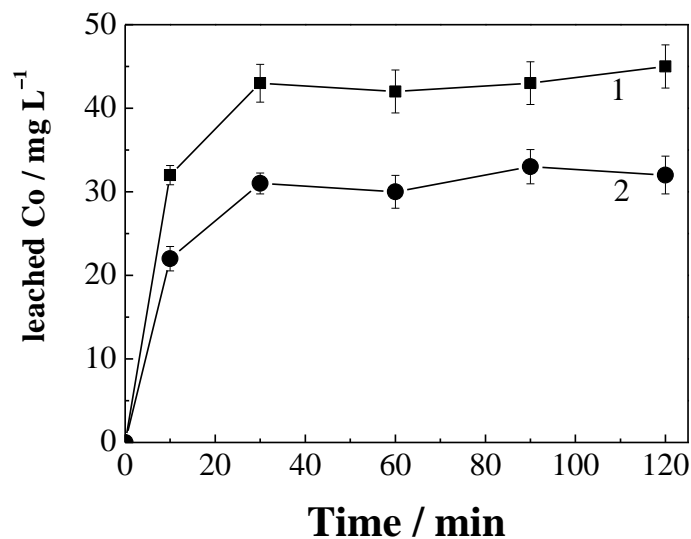


Fig. S5. Dissolution of Co from CBO in solutions at (1) acidic and (2) neutral pH values. Reaction conditions: initial MB concentration $20 \mu\text{mol L}^{-1}$, initial PMS concentration 0.5mmol L^{-1} and catalyst load 0.05g L^{-1} .

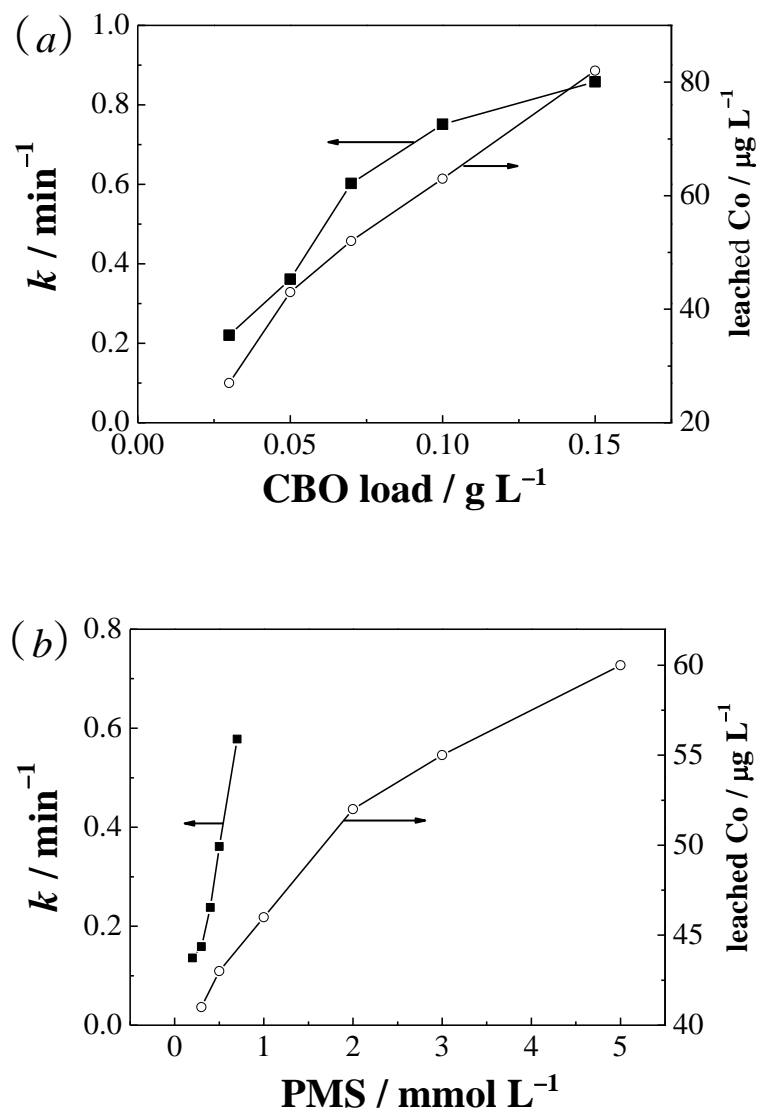


Fig. S6. Effects of (a) CBO load and (b) initial PMS concentration on the apparent degradation rate constant k of MB ($20 \mu\text{mol L}^{-1}$) and dissolution of Co^{2+} in the system of CBO and PMS.

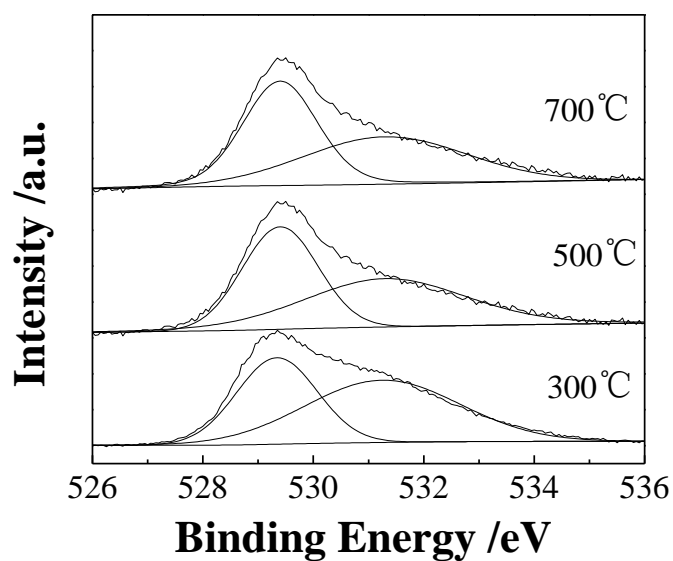


Fig. S7. O1s envelopes (and their deconvolution) for the CBO catalyst calcined at different temperatures.

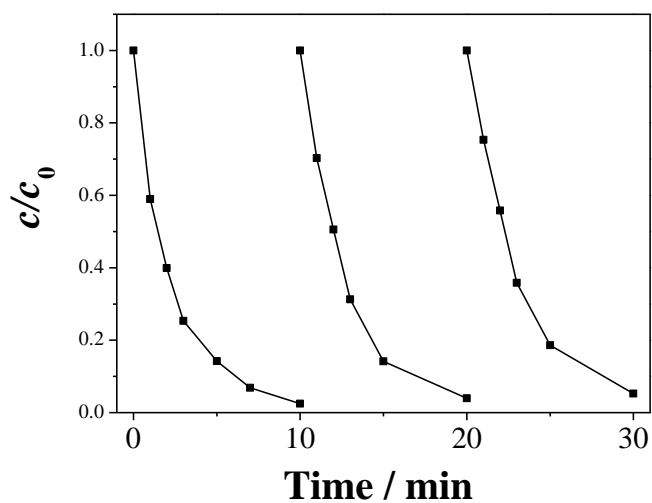


Fig. S8. Degradation of MB by PMS with the recycled CBO catalysts. Reaction conditions: initial MB concentration $20 \mu\text{mol L}^{-1}$, initial PMS concentration 0.5 mmol L^{-1} , CBO load 0.05 g L^{-1} , and reaction solution volume 300 mL.