

Facile synthesis of $\text{Cu}_2\text{PO}_4\text{OH}$ hierarchical nanostructures and the improved catalytic activity by hydroxyl group †

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Table 1 The band gap (E_g), VBM (E_{VB}) and CBM (E_{CB}) of $\text{Cu}_2\text{PO}_4\text{OH}$.

Chemicals	* $X(eV)$	$E_g(eV)$	$E_{VB}(eV)$	* $E_{CB}(eV)$
$\text{Cu}_2\text{PO}_4\text{OH}$	6.47	2.82	3.38	0.56

*Notes: X , the geometric mean of Mulliken's electronegativities; E_g , band gap; VBM, valence band maximum; CBM, conduction band minimum.

The positions of conduction and valence bands (E_{CB} , E_{VB}) are calculated by Eq. 2 and 3 as follows.

$$E_{CB}=X - E_e - 0.5E_g \quad (2)$$

$$E_{VB}=X - E_e + 0.5E_g \quad (3)$$

Where X is the geometric mean of Mulliken's electronegativities of constituent atoms, E_e is the energy of free electrons on the hydrogen scale ($\sim 4.5 eV$), and E_g is the band gap.

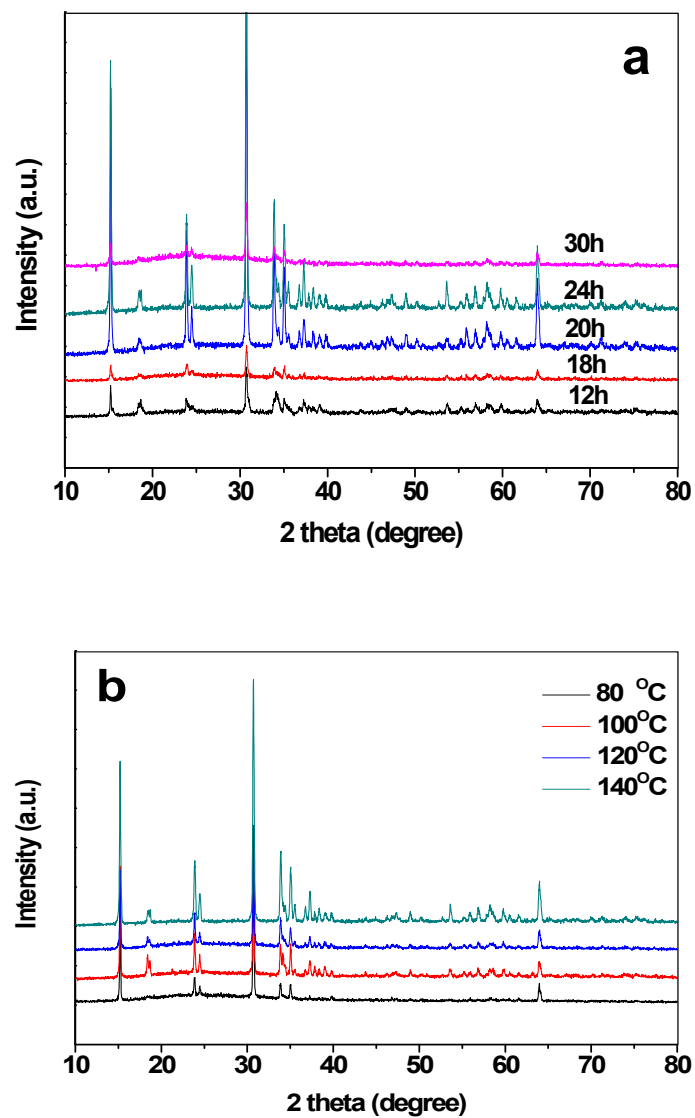


Fig. S1 X-ray diffraction (XRD) patterns of the samples synthesized at different reaction times (a) and temperatures (b).

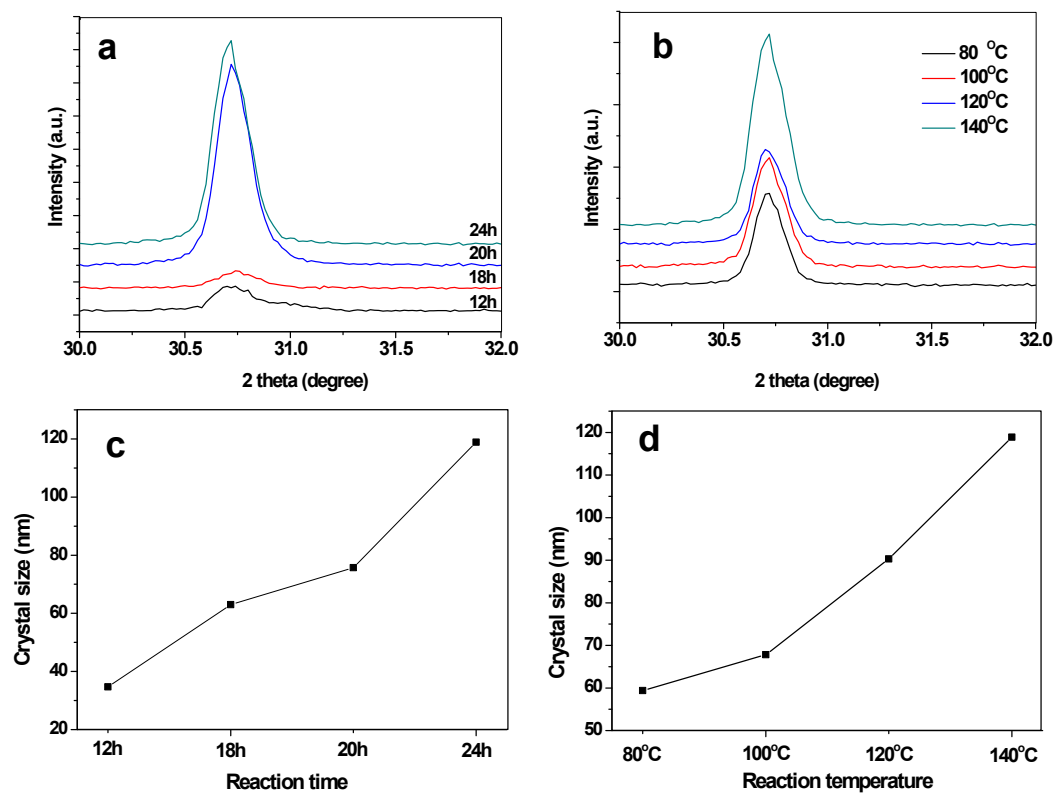


Fig. S2 (220) diffraction peaks ($30\text{--}32^\circ$) and average crystallite sizes calculated by Scherrer equation of $\text{Cu}_2\text{PO}_4\text{OH}$ obtained at different reaction times (a,c) and temperatures (b,d).

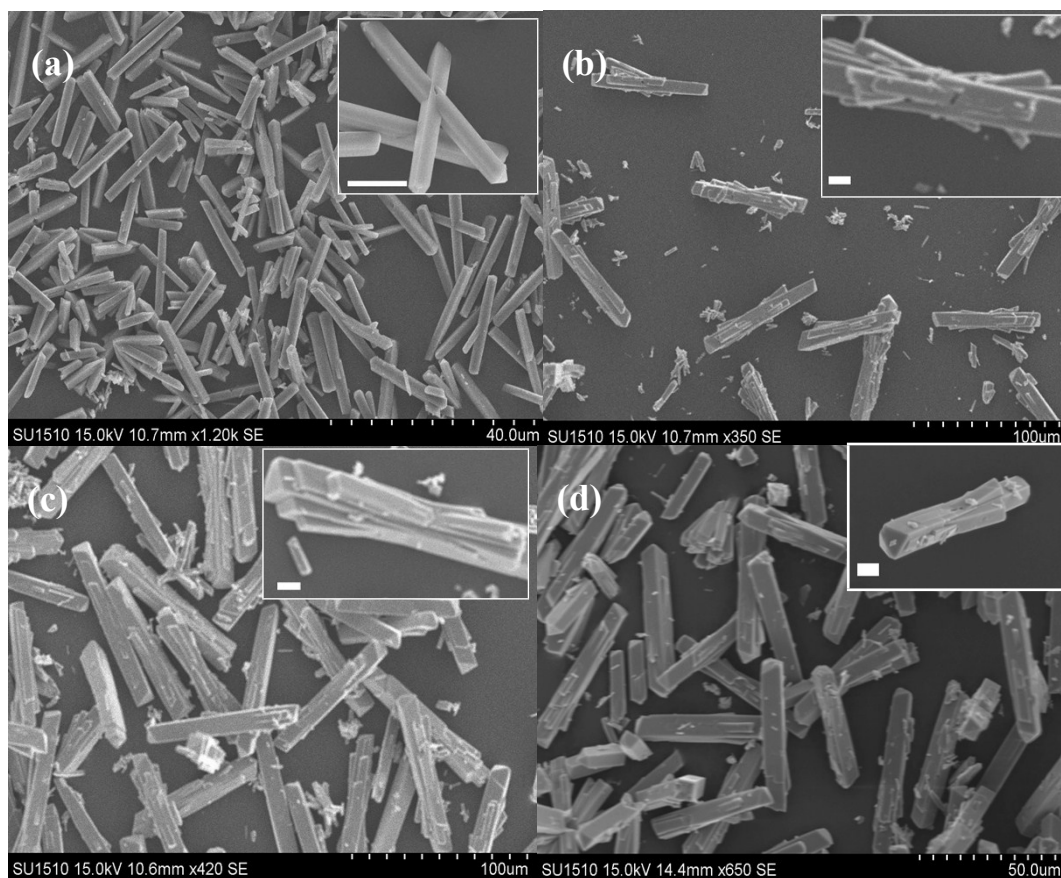


Fig. S3 SEM images of the samples prepared at different reaction times: (a) 12 h; (b) 18 h; (c) 20 h; (d) 24 h; Scale bar = 5 μm .

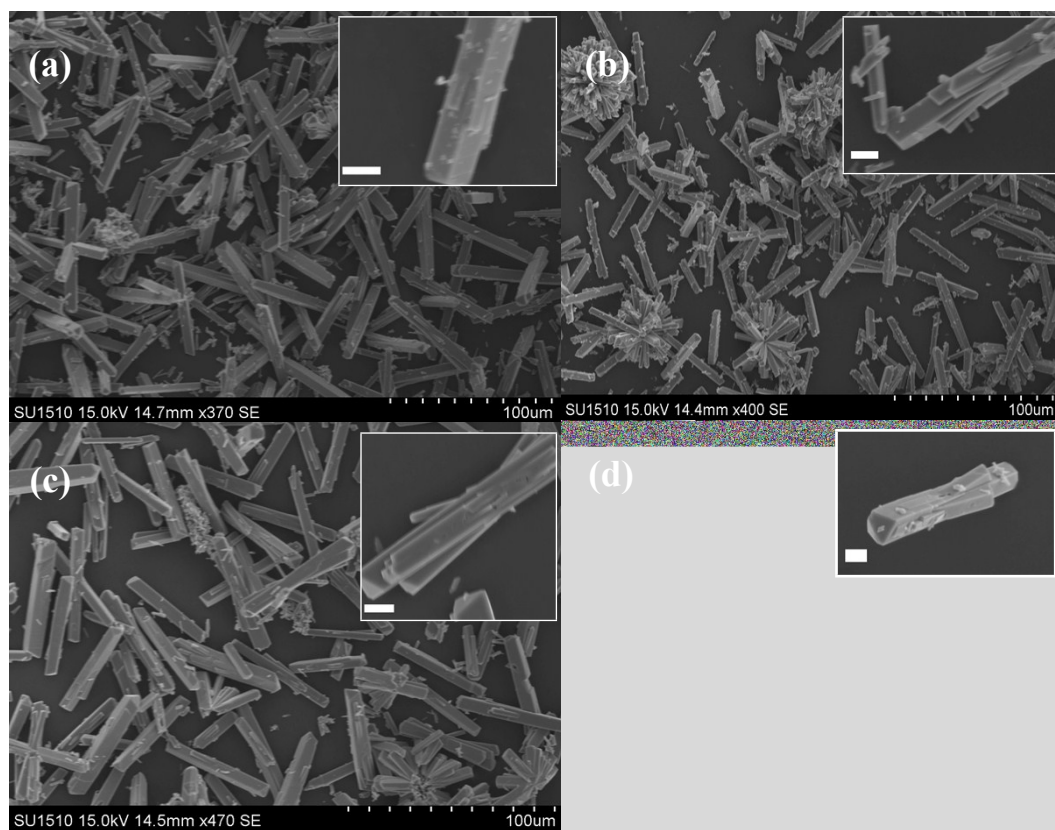


Fig. S4 SEM images of the samples prepared at different reaction temperatures: (a) 80 °C; (b) 100 °C; (c) 120 °C; (d) 140 °C; Scale bar = 5 μm .

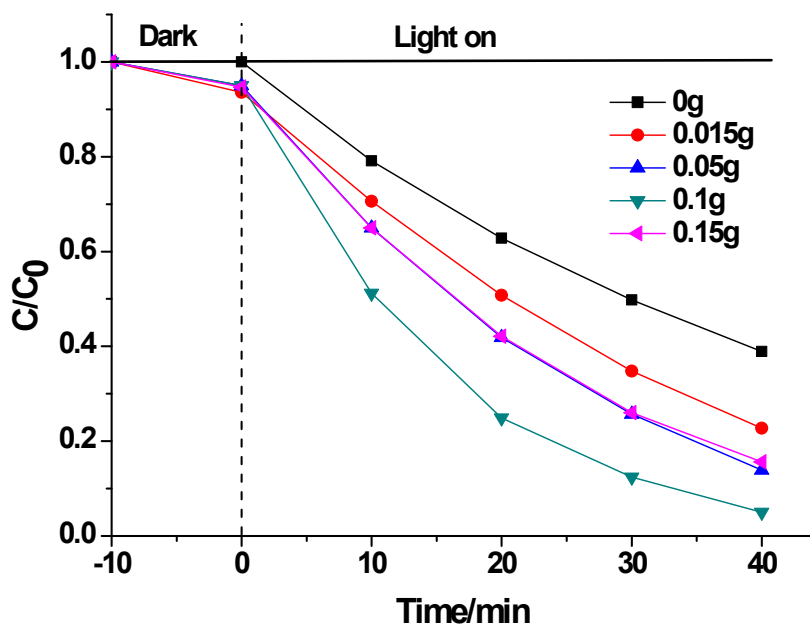


Fig. S5 Effect of catalyst loading on the catalytic degradation of RhB over S-Cu₂PO₄OH in the presence of H₂O₂ under UV irradiation ($\lambda \leq 420$ nm).

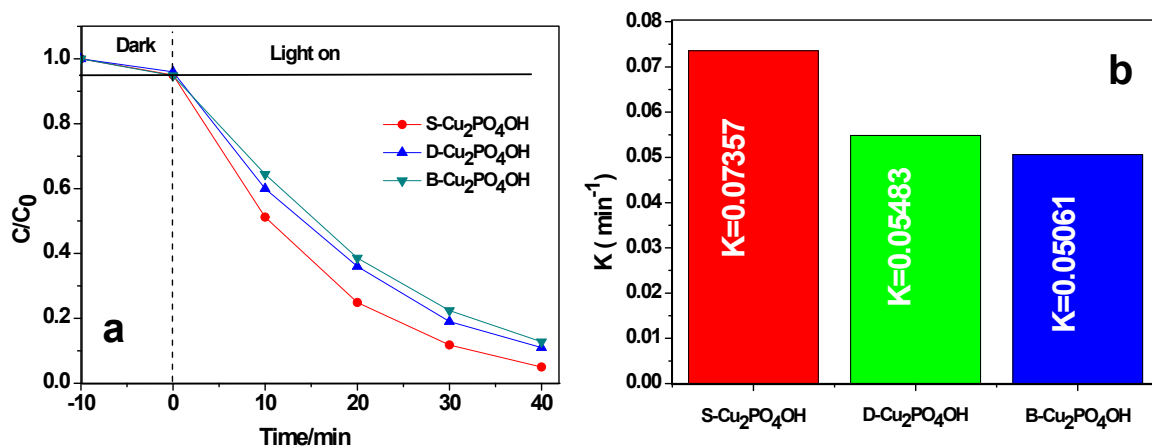


Fig. S6 Degradation curves (a) and apparent reaction kinetic constants (b) of the samples for the degradation of rhodamine B (RhB) in the presence of H₂O₂ under UV irradiation ($\lambda \leq 420$ nm).

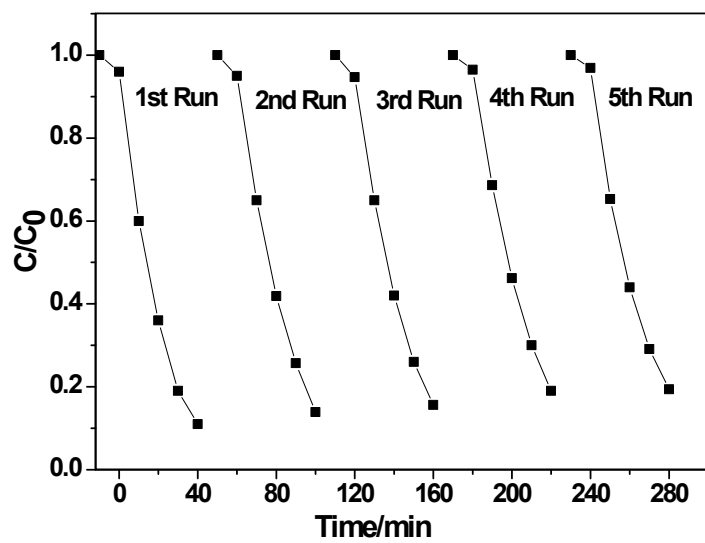


Fig. S7 The cycle experiment of S-Cu₂PO₄OH for the degradation of rhodamine B (RhB) in the presence of H₂O₂ under UV irradiation.

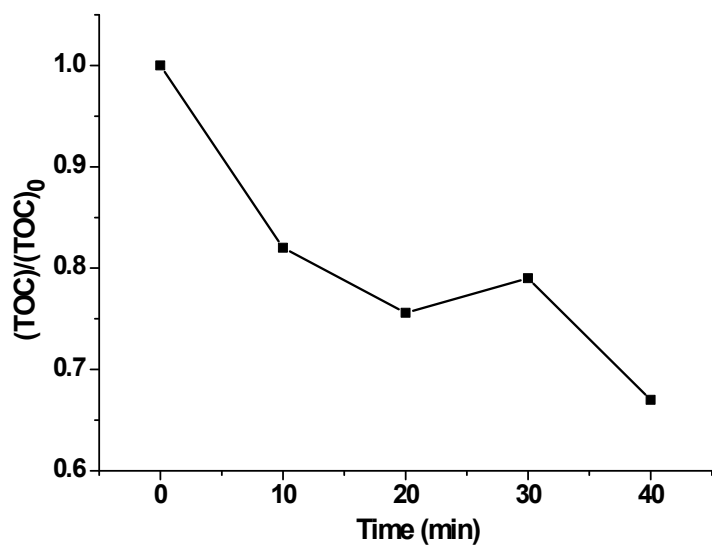


Fig. S8 Changes of TOC during the degradation of RhB over S-Cu₂PO₄OH in the presence of H₂O₂ under UV irradiation ($\lambda \leq 420$ nm).