

Nanoporous Ni(OH)₂ Interlinked Co₃O₄ Heterojunction: A Novel Approach to Chromium (VI) Detection

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The average crystallite size (D) is calculated using the following equation:

$$D = \frac{\lambda}{\beta \cos \theta} K \dots \dots \dots \text{(Equation 2)}$$

where:

- K (*Shape Factor*): 0.9 (standard for spherical nanoporous structures).
- λ (X-ray Wavelength): 0.15406 nm (for the Cu-K α radiation)
- β (FWHM): The Full Width at Half Maximum of the diffraction peak (converted to radians).
- θ (Bragg Angle): Half of the 2θ value of the chosen peak.

From Figure 2a, the most prominent peak for the heterojunction is observed at $2\theta=31.1^\circ$, corresponding to the Co_3O_4 phase, $2\theta=31.1^\circ \rightarrow \theta=15.55^\circ$.

From the high-resolution XRD pattern provided in the manuscript, the average FWHM (β) for the primary peaks is approximately 0.0152 radians (derived from a 0.87° broadening).

By plugging the values into the equation

$$D = 0.0152 \times \cos(15.55^\circ) \times 0.9 \times 0.15406$$

$$D = 0.0152 \times 0.96340 \times 0.138654$$

$$D = 0.014640 \times 0.138654$$

$$D \approx 9.5 \text{ nm.}$$

Table S1 Comparison of kinetic parameters of Ni(OH)₂/Co₃O₄ nanocomposites with other reported materials.

Catalyst	Substrate	V_{\max} (M·s ⁻¹)	K_m (mM)	Reference
Fe SAEs	TMB	5.88×10^{-8}	3.92	1
	H ₂ O ₂	8.25×10^{-8}	0.243	
Au NPs/Cu-MOFNs	TMB	6.60×10^{-9}	0.29	2
	H ₂ O ₂	3.75×10^{-9}	0.65	
Cu ₃ P NPs	TMB	4.26×10^{-8}	3.67	3
	H ₂ O ₂	5.16×10^{-8}	8.11	
PANi– MnO ₂ –Pd	TMB	300.24×10^{-9}	0.13	4
	H ₂ O ₂	172.8×10^{-9}	2.55	
ZnBNC	TMB	6.00×10^{-8}	0.07	5
	H ₂ O ₂	12.24×10^{-8}	4.70	
PNPG-PEG	TMB	3.0276×10^{-9}	0.2828	6
	H ₂ O ₂	2.467×10^{-9}	0.0799	
Ni(OH) ₂ /Co ₃ O ₄	TMB	4.77×10^{-8}	0.53	<i>This work</i>

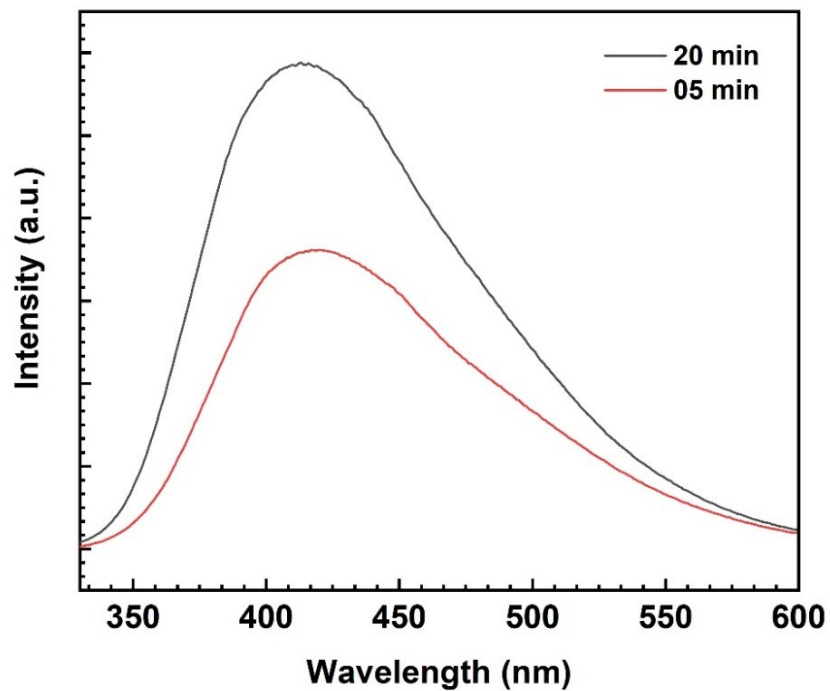


Fig. S1. Photoluminescence spectra (PL) of TMB oxidation reaction confirming the generation of $\bullet\text{OH}$ radicals

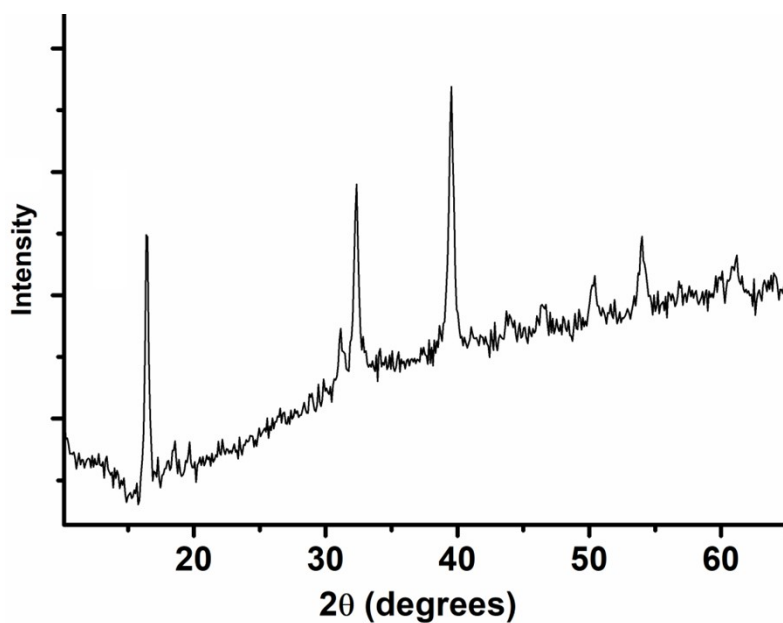


Fig. S2 PXRD analysis on the catalyst recovered after five consecutive cycles.

References

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