



Supplementary Materials

Synthesis, Characterization and Photocatalytic Activity of $\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3$ Dispersed in Mesoporous KIT-6

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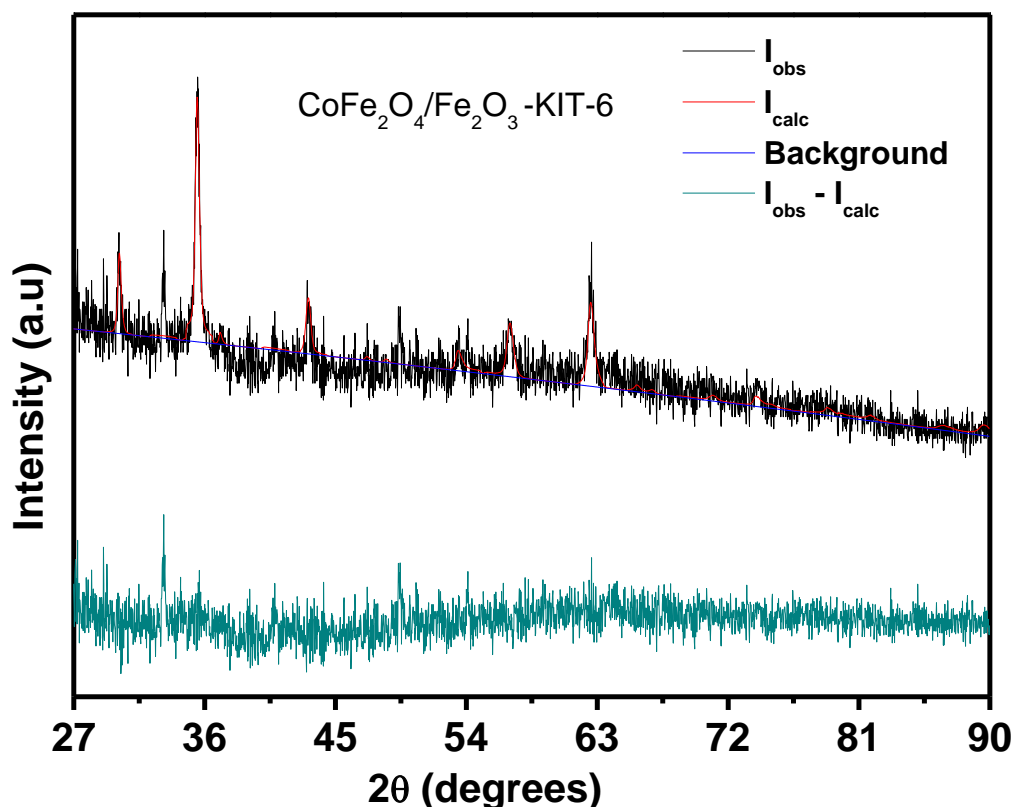


Figure S1. Rietveld refinement for the $\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3$ -KIT-6 solid.

Table S1. Mesoporous structure parameters: Interplanar distance($D_{(211)}$) and mesoporous structure parameter for cubic structure ($a_{0\text{cubic}}$).

Sample	$D_{(211)}$	$a_{0\text{cubic}}$
KIT-6	9.014	22.079
$\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3\text{-KIT-6}$	8.429	20.646

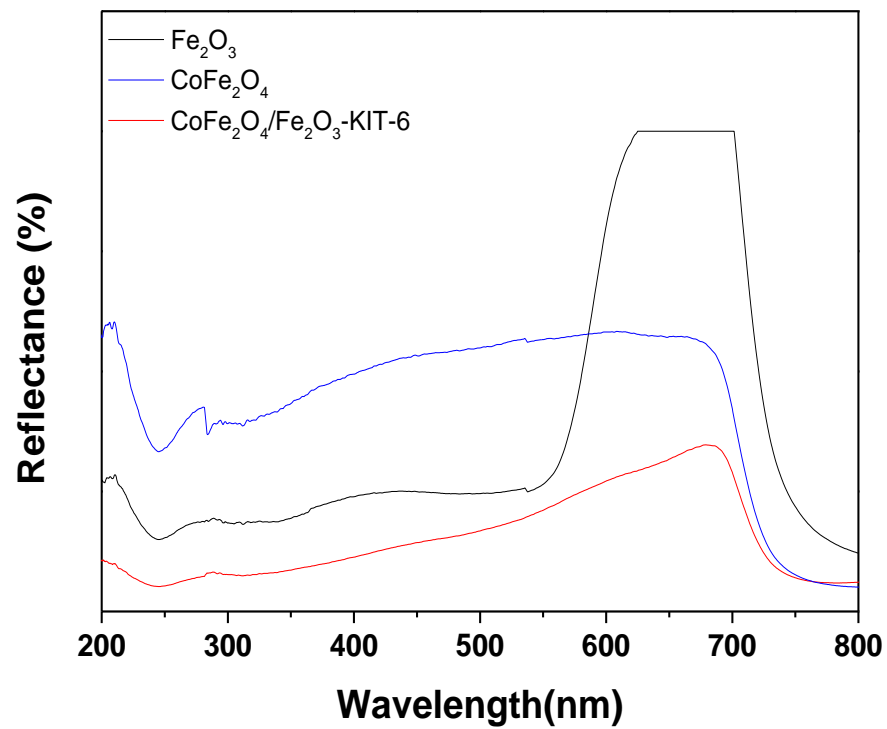


Figure S2. Diffuse reflectance spectra (DRS) of $\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3\text{-KIT-6}$ solid, pure Fe_2O_3 and pure CoFe_2O_4 .

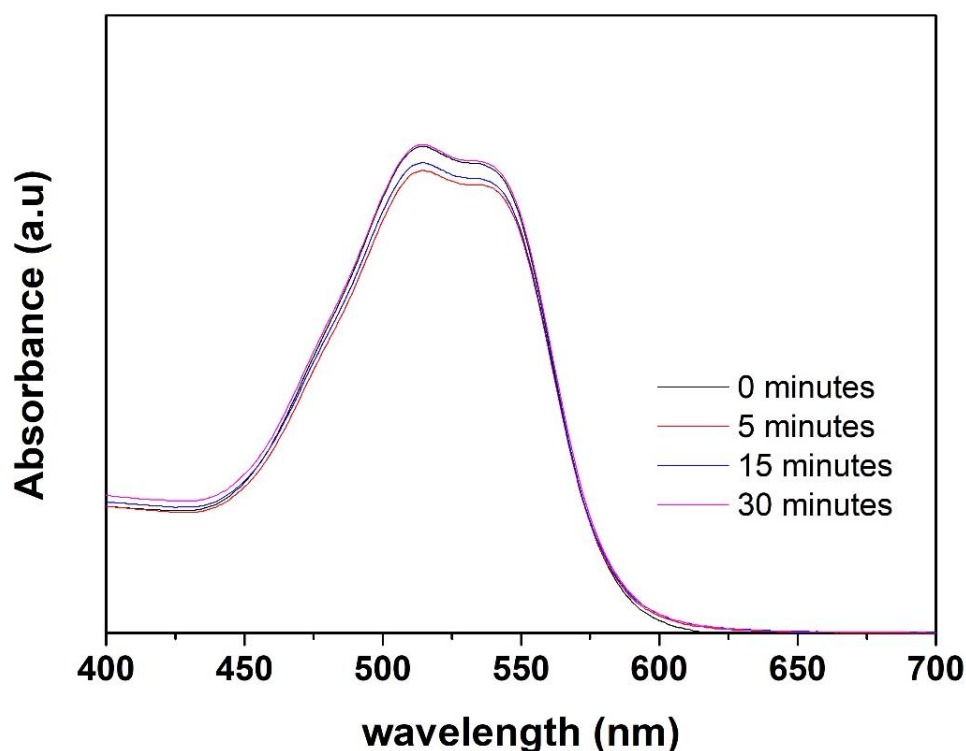


Figure S3. Dye adsorption in 30 min in the absence of light using CoFe₂O₄/Fe₂O₃-KIT-6 photocatalyst.

The anatase phase (TiO₂) was added to the CoFe₂O₄/Fe₂O₃-KIT-6 catalyst to verify if there was an improvement in the degradation process compared to the solid proposed in the study. The XRD of the TiO₂/CoFe₂O₄/Fe₂O₃-KIT-6 photocatalyst is described in Figure S4. The titanium oxide impregnation process was carried out successfully, forming anatase, in the proportion of 10% by mass, Figure S4. It was not possible to identify the Fe₂O₃ phase, probably due to its low concentration and the increase in the number of phases present in the solid.

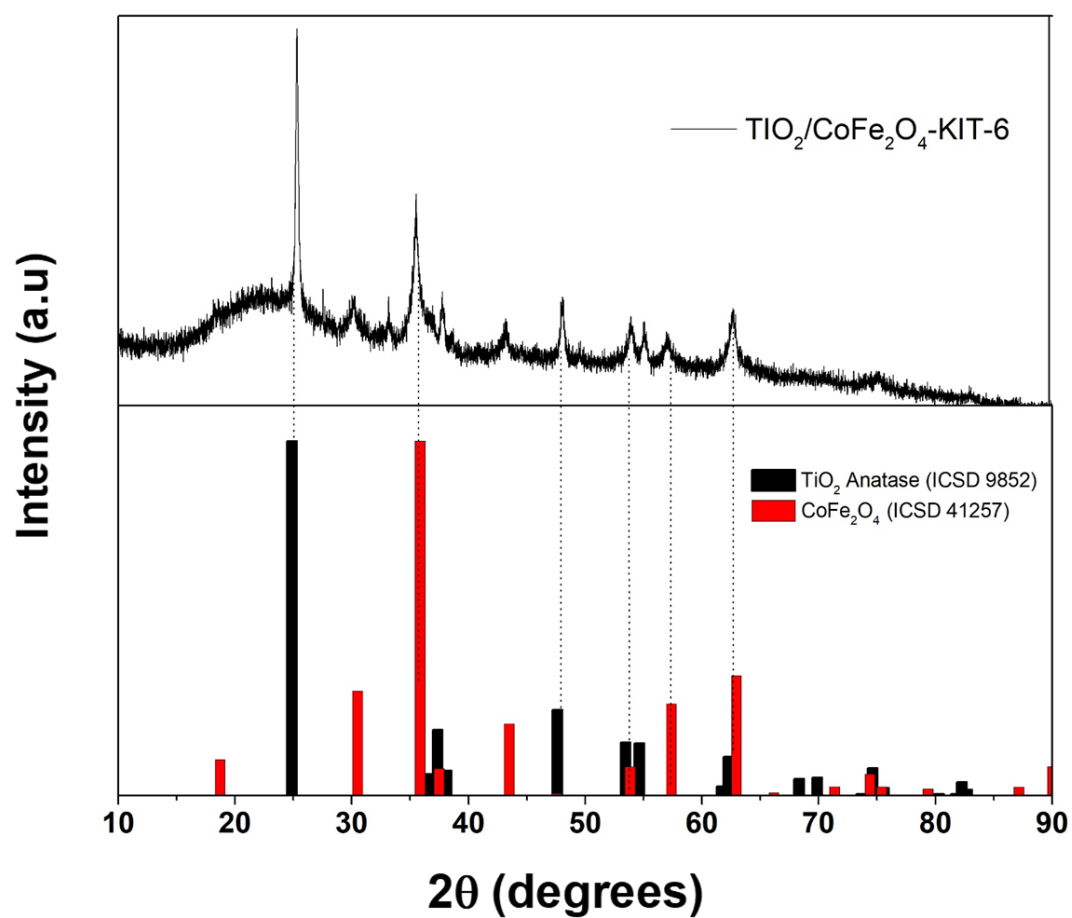


Figure S4. XRD result for the $\text{TiO}_2/\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3$ -KIT-6 photocatalyst.

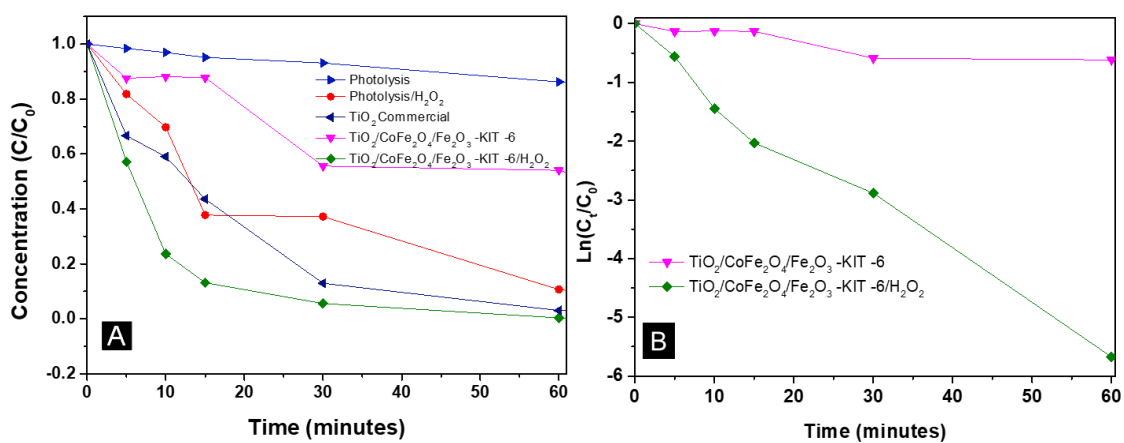


Figure S5. Tests for the $\text{TiO}_2/\text{CoFe}_2\text{O}_4/\text{Fe}_2\text{O}_3$ -KIT-6 catalyst. (A) degradation of the URRD dye and (B) kinetic parameter of the reaction.

Table S2. Degradation rate and kinetic parameters for systems with TiO₂/CoFe₂O₄/Fe₂O₃–KIT-6 for 1h of reaction.

Sample	Degradation rate (%)	R ²	k` (min-1)	t _{1/2} (min)
TiO ₂ /CoFe ₂ O ₄ /Fe ₂ O ₃ –KIT-6 without H ₂ O ₂	46	0.96	0.00975	71.1
TiO ₂ /CoFe ₂ O ₄ /Fe ₂ O ₃ –KIT-6 with H ₂ O ₂	99	0.97	0.09229	7.51

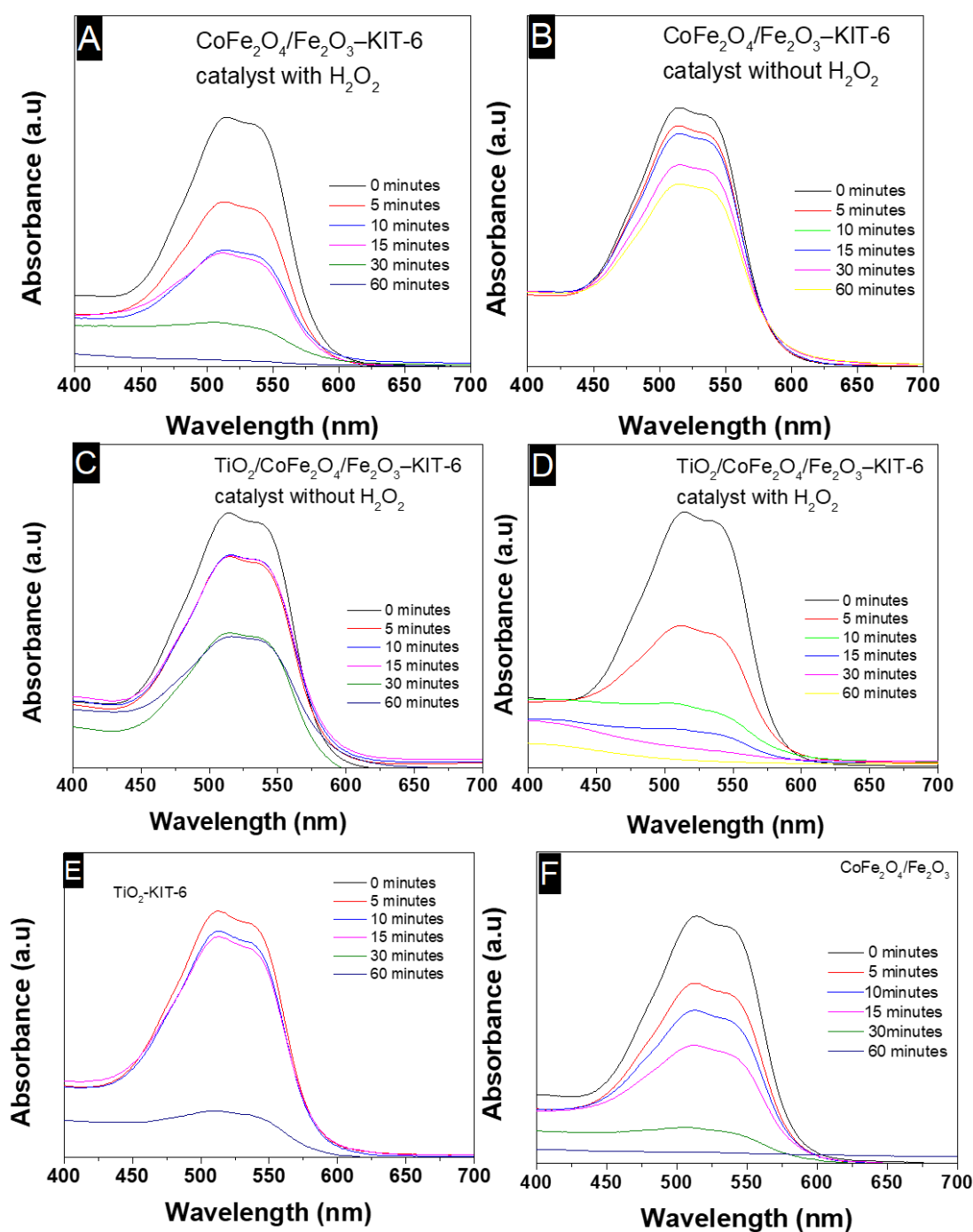


Figure S6. Degradation of the URRD dye. (A) CoFe₂O₄/Fe₂O₃-KIT-6 catalyst with H₂O₂; (B) CoFe₂O₄/Fe₂O₃-KIT-6 catalyst without H₂O₂; (C) TiO₂/CoFe₂O₄/Fe₂O₃-KIT-6 catalyst without H₂O₂; (D) TiO₂/CoFe₂O₄/Fe₂O₃-KIT-6 catalyst with H₂O₂; (E) TiO₂/KIT-6 catalyst with H₂O₂; (F) CoFe₂O₄/Fe₂O₃ solid with H₂O₂.

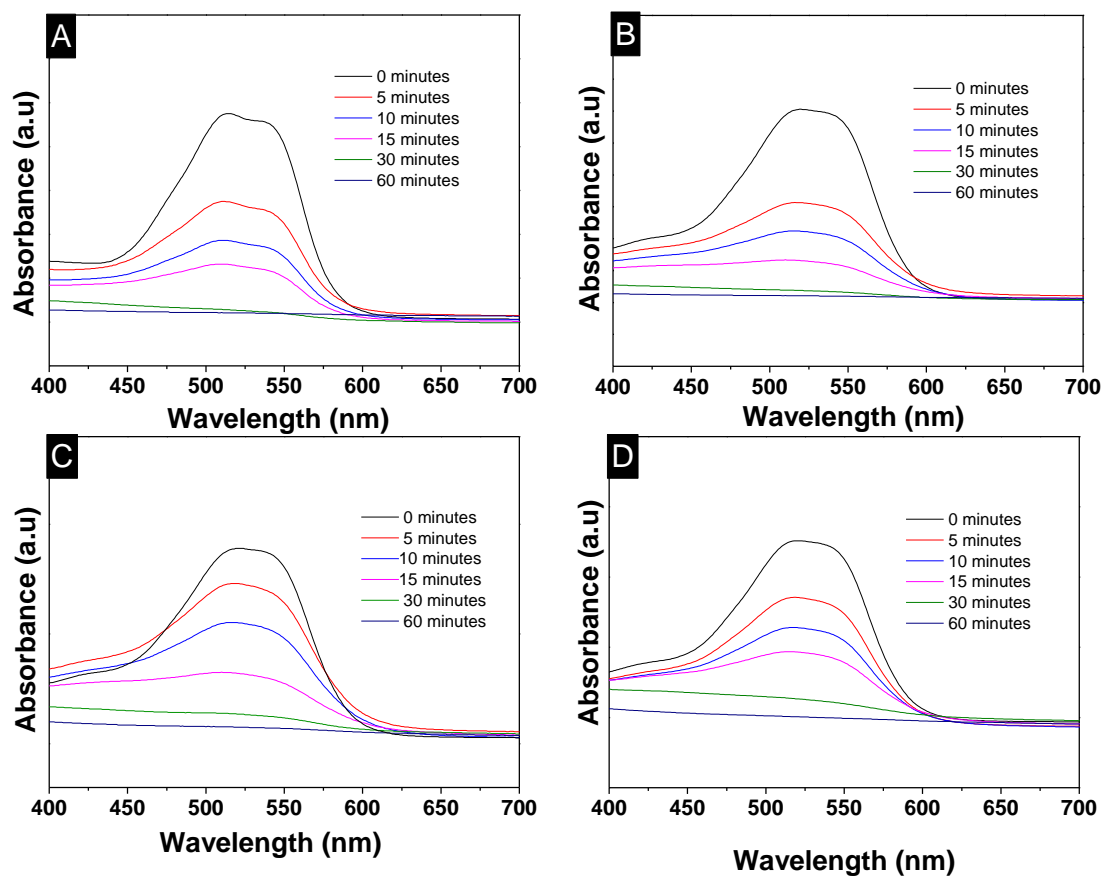


Figure S7. Photocatalyst reuse. (A) first cycle; (B) second cycle; (C) Third cycle; (D) fourth cycle.

Table S3. Possible by-products for the photocatalytic degradation of the URRD dye in 15 min of reaction.

Major by-products	Molecular Weight (g mol ⁻¹)	Structure	% Similarity with NIST	Major ions
1-Methyl - 3 -phenylindole	207		75	96,133, 191, 207
2,4-Dimethylbenzo[h]quinoline	207		74	96,133, 191, 207