

Electronic Supporting Information

Visible Light Induced Photocatalytic Removal of Organic Dye Using Metal

Doped Iron Oxide Based Catalysts Derived from Red Mud

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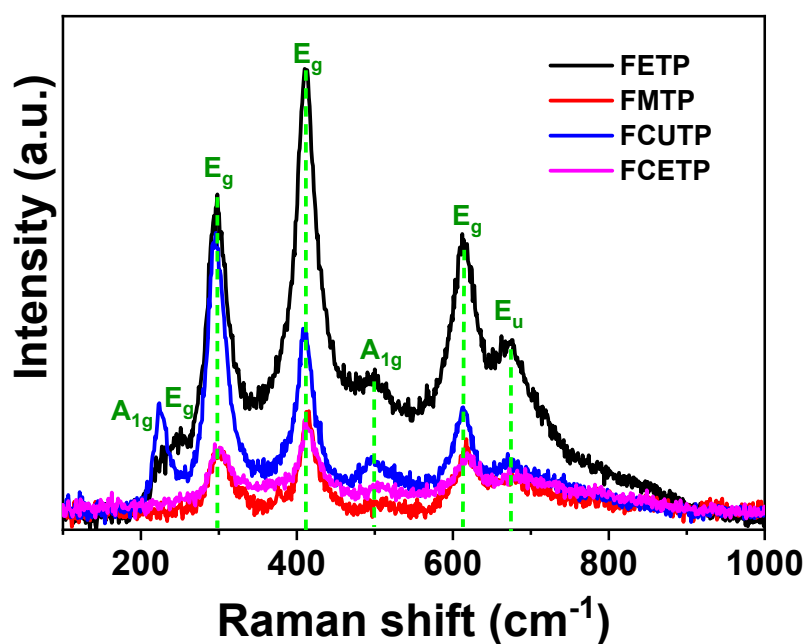


Fig. S1: Raman spectra of α -Fe₂O₃ and doped samples.

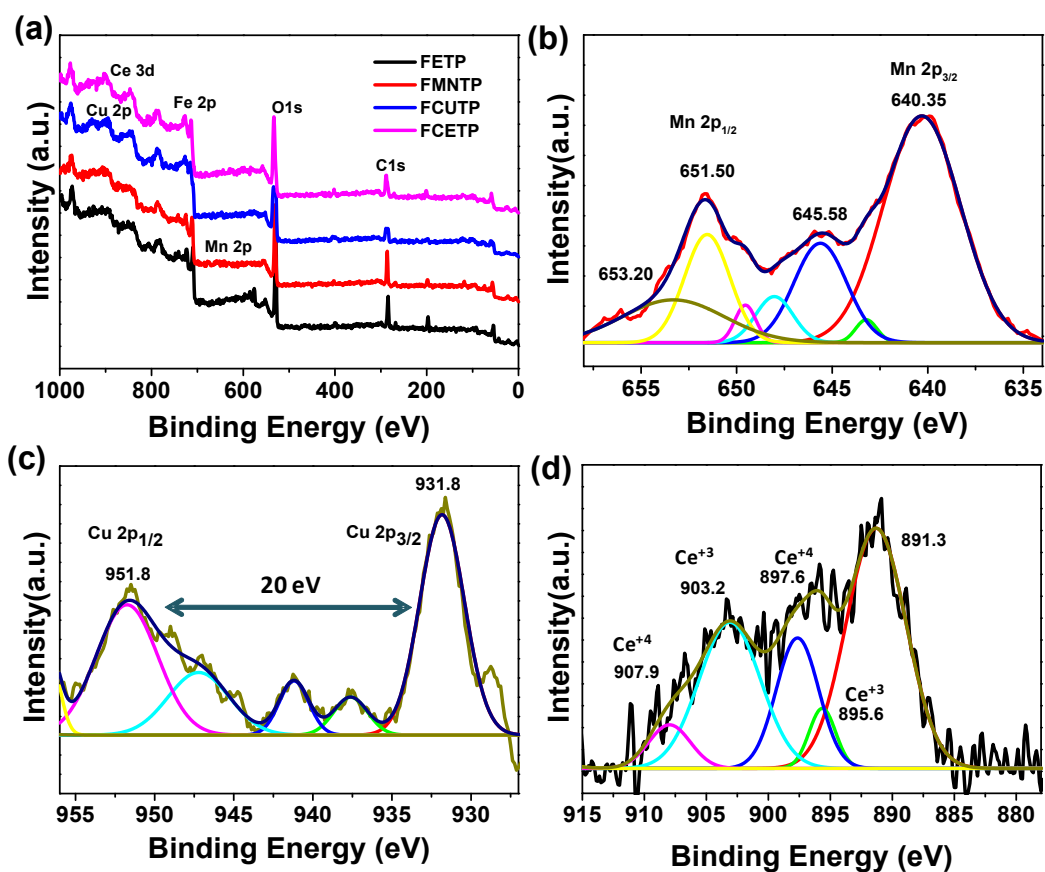


Fig. S2: XPS spectra of a) Survey b) Mn (2p) c) Cu(2p) and d) Ce (3d) for samples FMNTP, FCUTP and FCETP, respectively.

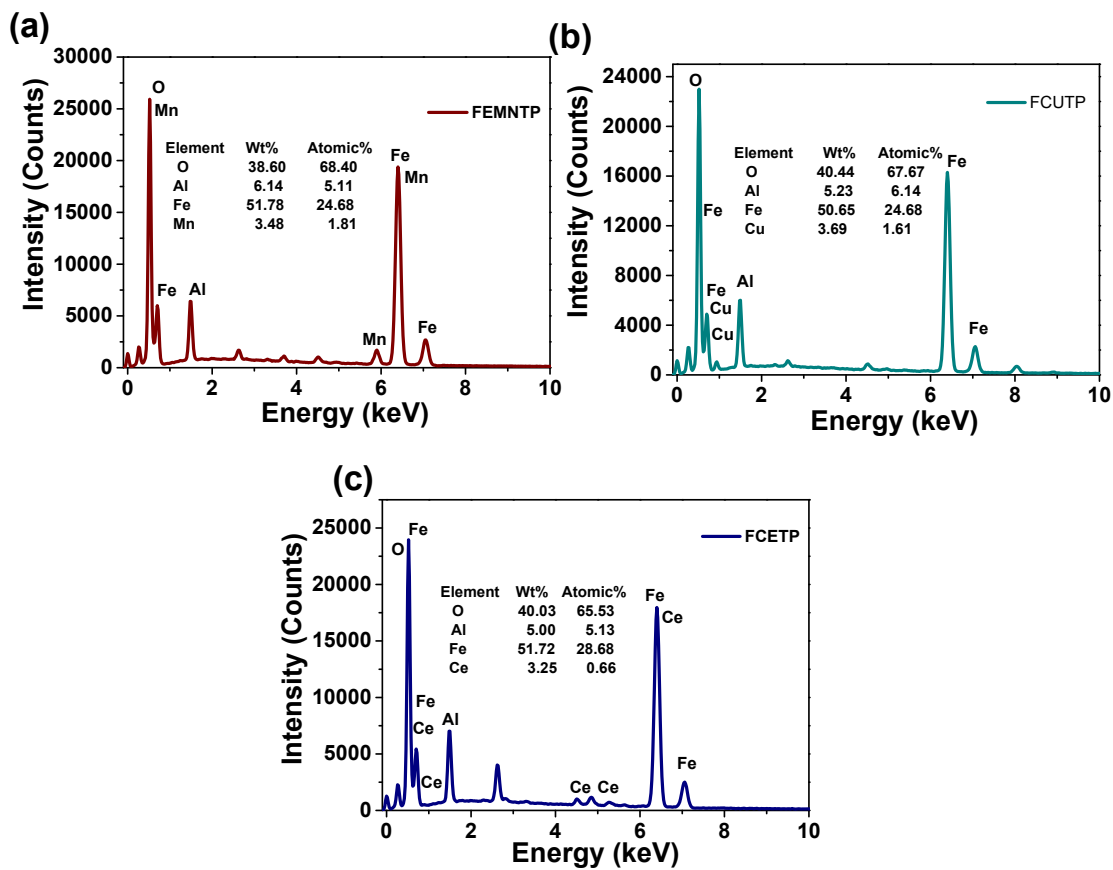


Fig. S3: EDX spectra of a) FMNTP, b) FCUTP and c) FCETP

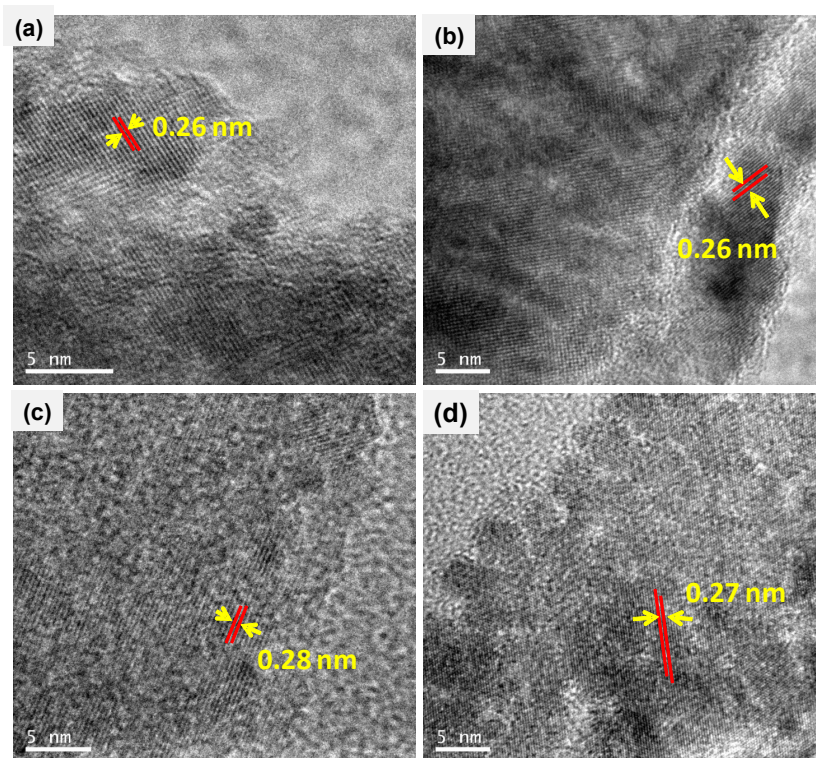


Fig. S4:HRTEM image of a)FETP b) FMNTP c) FCUTP and d) FCETP

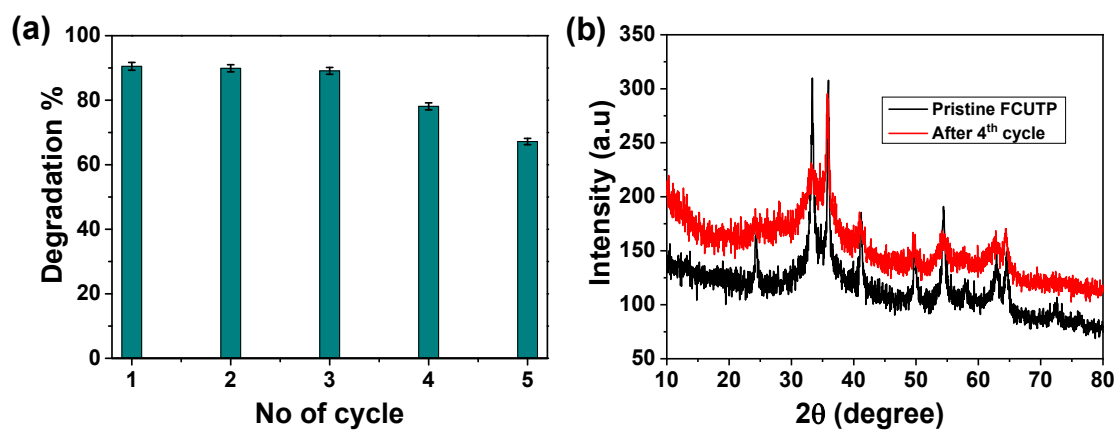


Fig. S5: (a) Recyclability test (b) XRD pattern of FCUTP for photostability test

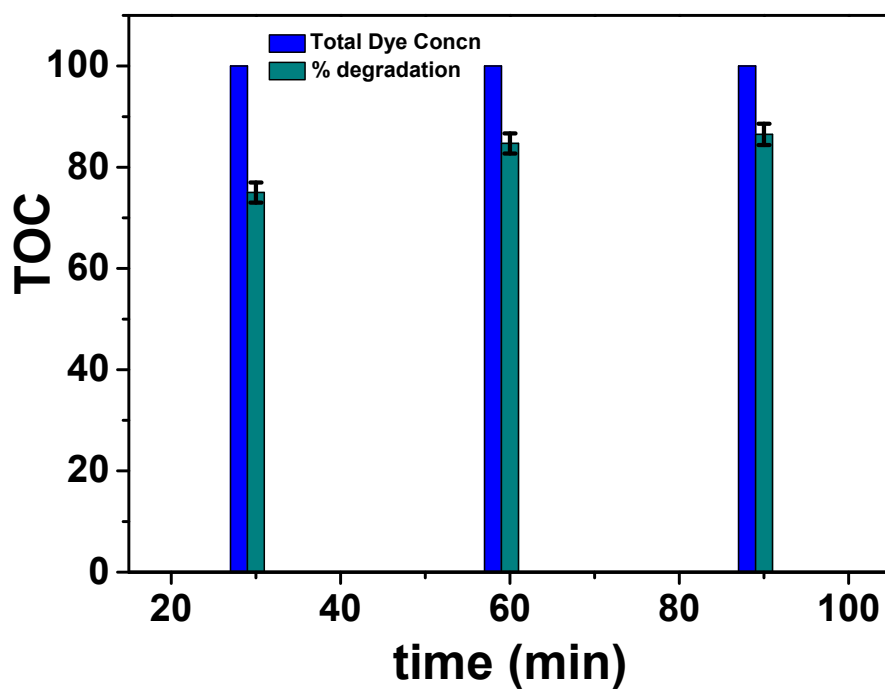


Fig. S6: TOC removal% at different reaction time

Table S1

Sample ID	S_{BET} (m^2g^{-1}) ^a	$V_{\text{p-Total}}$ (cm^3g^{-1}) ^b	D_{BJH} (nm) ^c
FETP	53.90	0.168	3.49
FMNTP	51.9	0.224	3.33
FCUTP	263.9	0.35	3.70
FCETP	312.5	0.111	3.50

^a Specific surface area, ^b Total pore volume, ^c Pore diameter

Table. S2

Sample ID	Removal %	Rate constant (min ⁻¹)	Ref
MnTiO ₃ /TiO ₂ catalyst	76	0.005	1
GF/TiO ₂ NTA	65.9	0.008	2
CuO nano particle	78	0.012	3
Red Mud derived Cudoped α -Fe ₂ O ₃ catalysts	90.9	0.040	Present work

Table S3. Fitting parameters of Nyquist plots

Material	R _s /Ω	R _{CT} /kΩ	C _{CT} /μMho	W/Ω
FETP	72.5	1950	4.5	60100
FMNTP	130	1511	5.6	0.009
FCUTP	60.8	576	9.0	0.001
FCETP	58.3	1790	4.1	0.006

References

- 1) S. Alkaykh, A.Mbarek and E.E. Ali-Shattle,*Heliyon.*,2020,**6**, e03663.

2) X. Cheng, H. Liu, Q. Chen, J. Li and P. Wang, *Carbon*, 2014, **66**, 450–458.

3) G. Sorekine ,G.Anduwan , M.N.Waimbo, H.Osora , S.Velusamy, S. Kim, Y. S. Kim and J.Charles, *Journal of Molecular Structure*, 2022, **1248**, 131487,.