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Electronic Supplementary Information

Magnetically Retrievable Lepidocrocite Supported Copper Oxide Nanocatalyst (Fe–CuO) for N-Arylation of Imidazole

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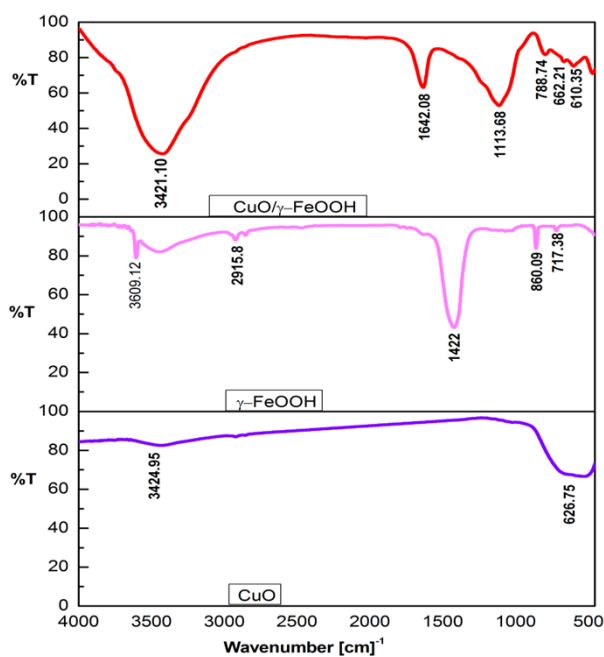


Fig. S1 FT-IR patterns of CuO, γ -FeOOH, and Fe – CuO.

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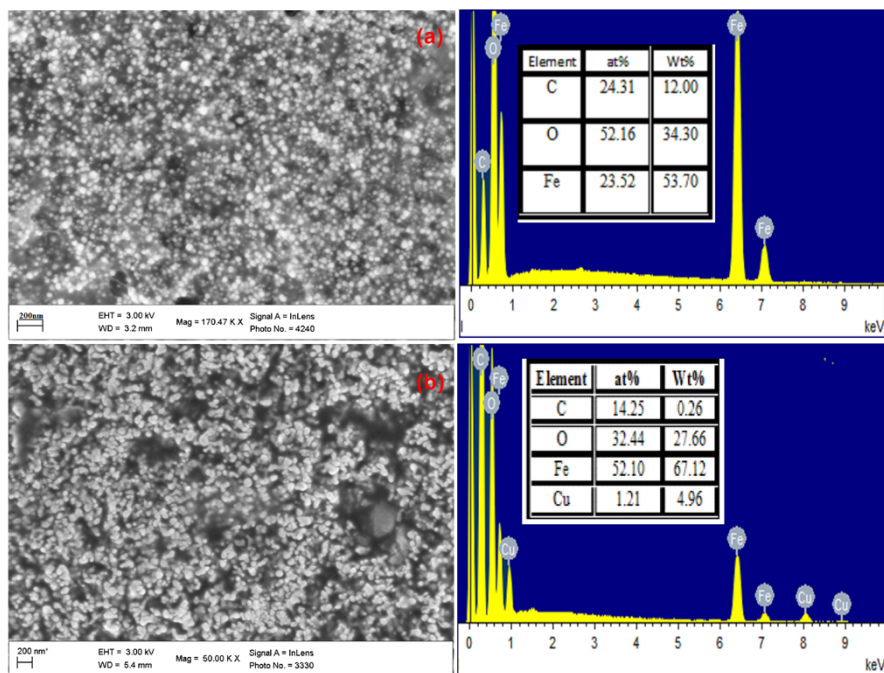


Fig. S2 SEM-EDAX micrographs of (a) γ -FeOOH and (b) Fe-CuO

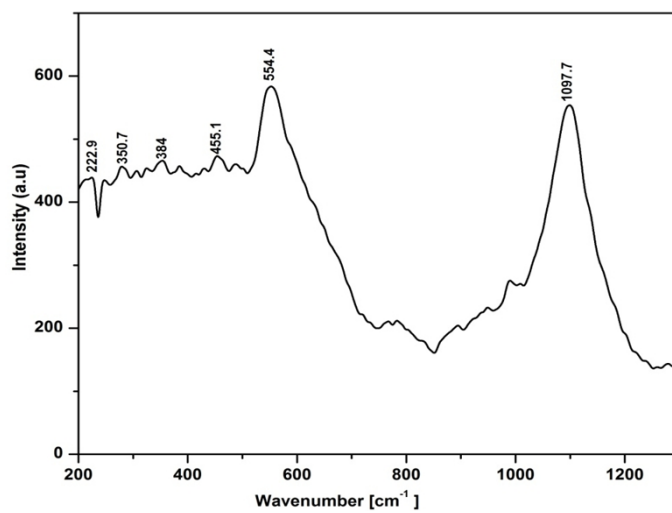


Fig. S3 Raman spectrum of Fe-CuO catalyst

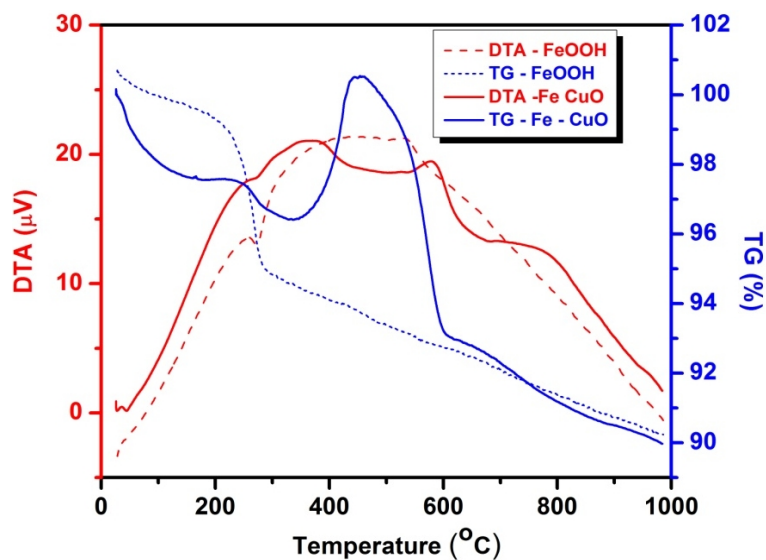
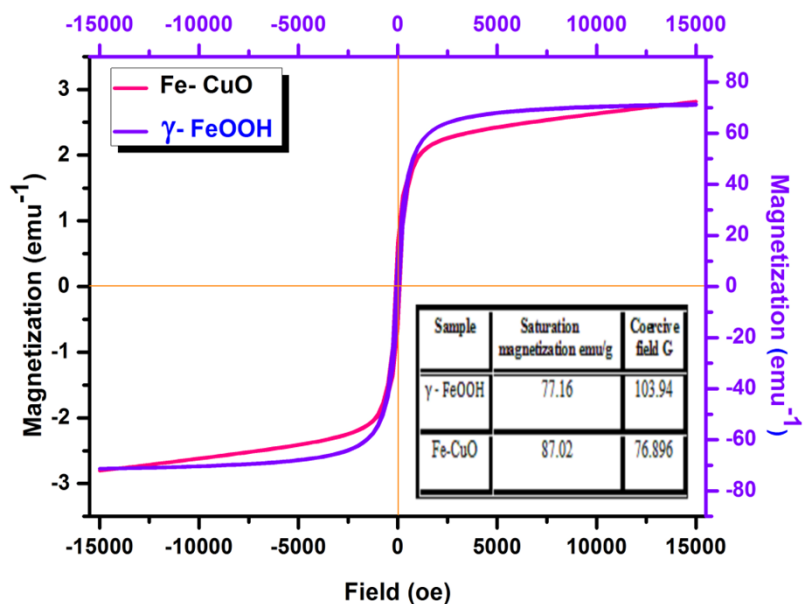


Fig. S4 TG/DTA curves of (a) pure γ -FeOOH and (b) Fe-CuO catalyst.



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Fig. S5 Magnetization curves of (a) pure γ -FeOOH and (b) Fe-CuO [inset: magnetization (Ms) and coercivity (Hc) table].

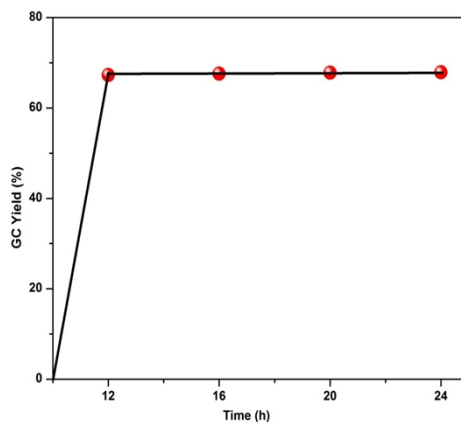
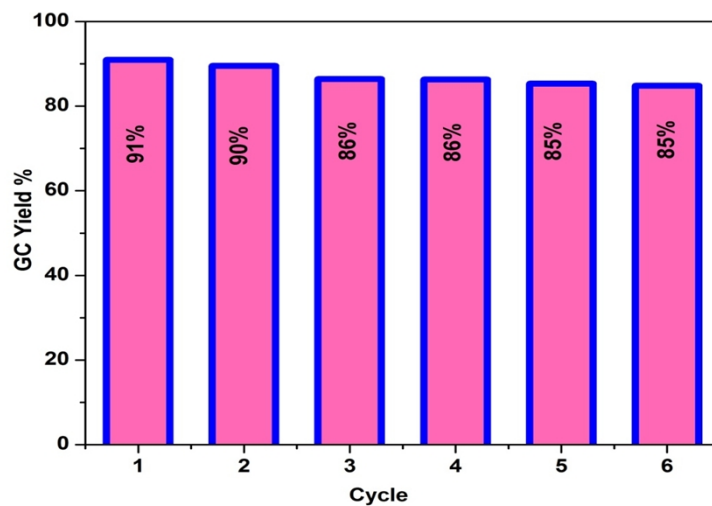


Fig. S6 Heterogeneity test of Fe-CuO for N-arylation of imidazole with 4-bromobenzonitrile [reaction conditions: 1.mmol (81 mg) of imidazole, 1mmol (182 mg) of 4-bromo benzonitrile, 2 mmol (276mg) of K_2CO_3 , and 10 mg of Fe-CuO in 4 mL of DMAc at 120 °C].

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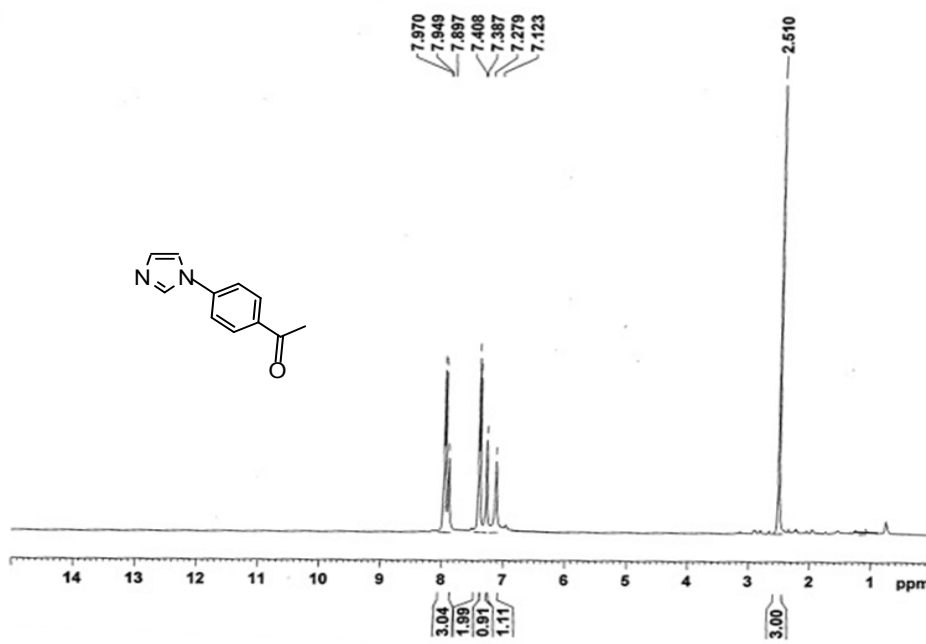
10 Fig. S7 Reusability of Fe-CuO nanocatalyst for N-arylation of imidazole with 4-bromobenzonitrile [reaction conditions: 1.2 mmol (81 mg) of imidazole, 1mmol(182 mg) of 4-bromobenzonitrile, 2 mmol (276 mg) of K_2CO_3 , and 10 mg of Fe-CuO in 4 mL of DMAc at 120 °C].

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NMR spectra of representative products

NMR spectra were obtained on a 400 MHz Bruker spectrometer in CDCl₃ using TMS as a standard.

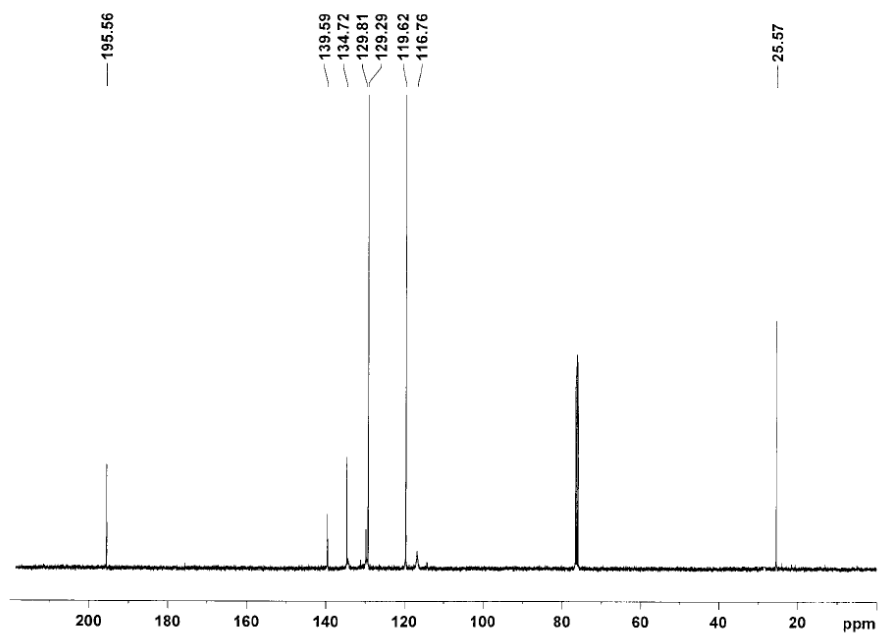


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Fig. S8 1-(4-Imidazol-1-ylphenyl)ethanone (Table 3, entry 3).

¹H NMR (400 MHz, CDCl₃): δ, ppm 7.99-7.90 (t, J = 8.0Hz, 4H), 7.42-7.37 (d, J = 6.0Hz, 2H), 7.10 (s, 1H), 2.56 (s, 3H).

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Fig. S9 1-(4-Imidazol-1-ylphenyl) ethanone (Table 3, entry 3).

^{13}C NMR (100 MHz, CDCl_3): δ , ppm 195.6, 139.5, 134.7, 129.8, 129.3, 119.6, 116.8, 25.6.

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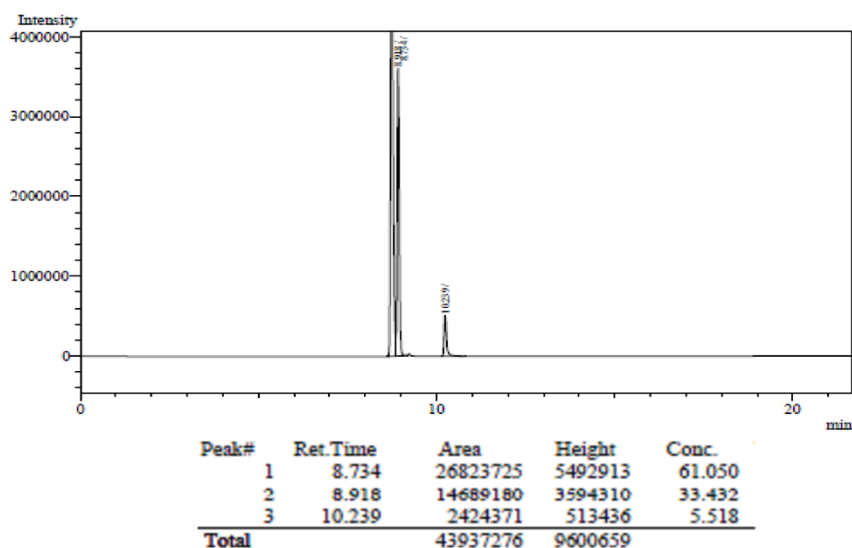
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GC Conditions:

GC (Shimadzu-2010) is equipped with 5% diphenyl and 95% dimethyl siloxane, Restek capillary column (60 m length, 0.32 mm dia) 5 and a flame ionization detector (FID). The column temperature was 220°C. The temperatures of the injection port and FID were kept constant at 250°C and 280°C, respectively during product analysis.

GC DATA

1. Condensation of 4-bromobenzonitrile and imidazole (Table 3, entry 13) with pure γ -FeOOH catalyst



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Fig. S10 Condensation of 4-bromobenzonitrile and imidazole

Table 1 Results of BET surface area measurements for Fe-CuO nanocatalyst

Sample	BET surface area (m ² g ⁻¹)	Single point adsorption total pore volume (cm ³ g ⁻¹)
Fe-CuO as prepared	83.1989	0.419177
Fe-CuO calcined at 500 °C for 3 h	50.3123	0.224613

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