

Electronic Supplementary Information

Fabrication and characterization of novel lignocellulosic biomass tailored Fe₃O₄ nanocomposites: influence of annealing temperature and chlorazol black E sequestration

Md. Juned K. Ahmed and M. Ahmaruzzaman*

Department of Chemistry, National Institute of Technology Silchar, Silchar-788010, India

*Corresponding author. Tel. +91-3842242915; Fax: +91-3842224797. E-mail address:
md_a2002@rediffmail.com (M. Ahmaruzzaman)*

2. Experimental

The percent removal and sequestration capacity of the LB, IONPs, and LB-IONCs were calculated using the following equations:

Percentage removal of the dye is predicted by:

$$\% \text{ removal} = \frac{(C_o - C_e)}{C_o} \times 100 \quad (S1)$$

Sequestration capacity is estimated by:

$$q_e = \frac{(C_o - C_e) \times V}{m} \quad (S2)$$

where C_o and C_e (mg L^{-1}) are the initial and equilibrium liquid phase concentration of the CBE, V (L) is the volume of the dye sample, and m (g) is the weight of the adsorbent used.

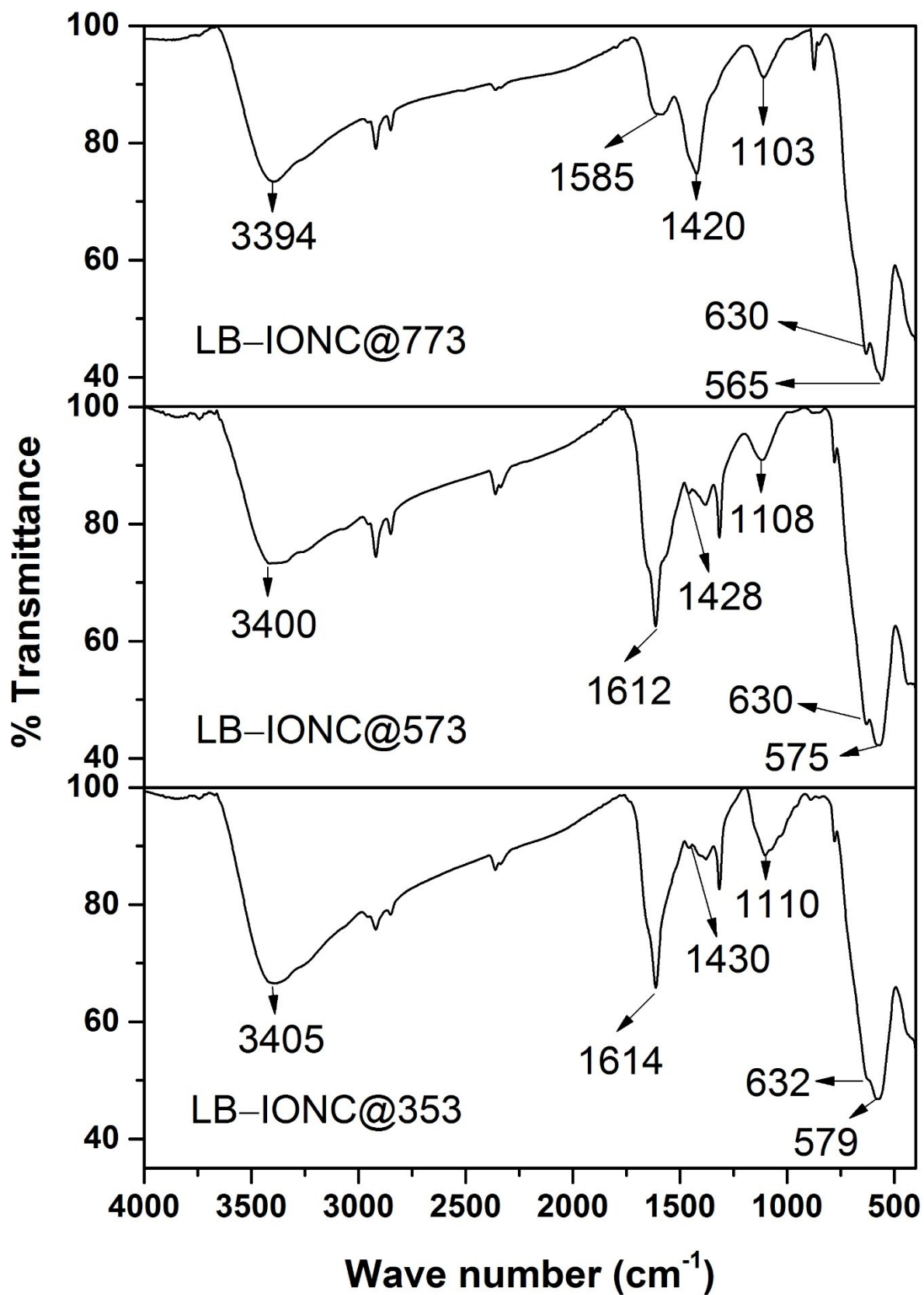


Fig. S1 FTIR spectra of the LB-IONCs.

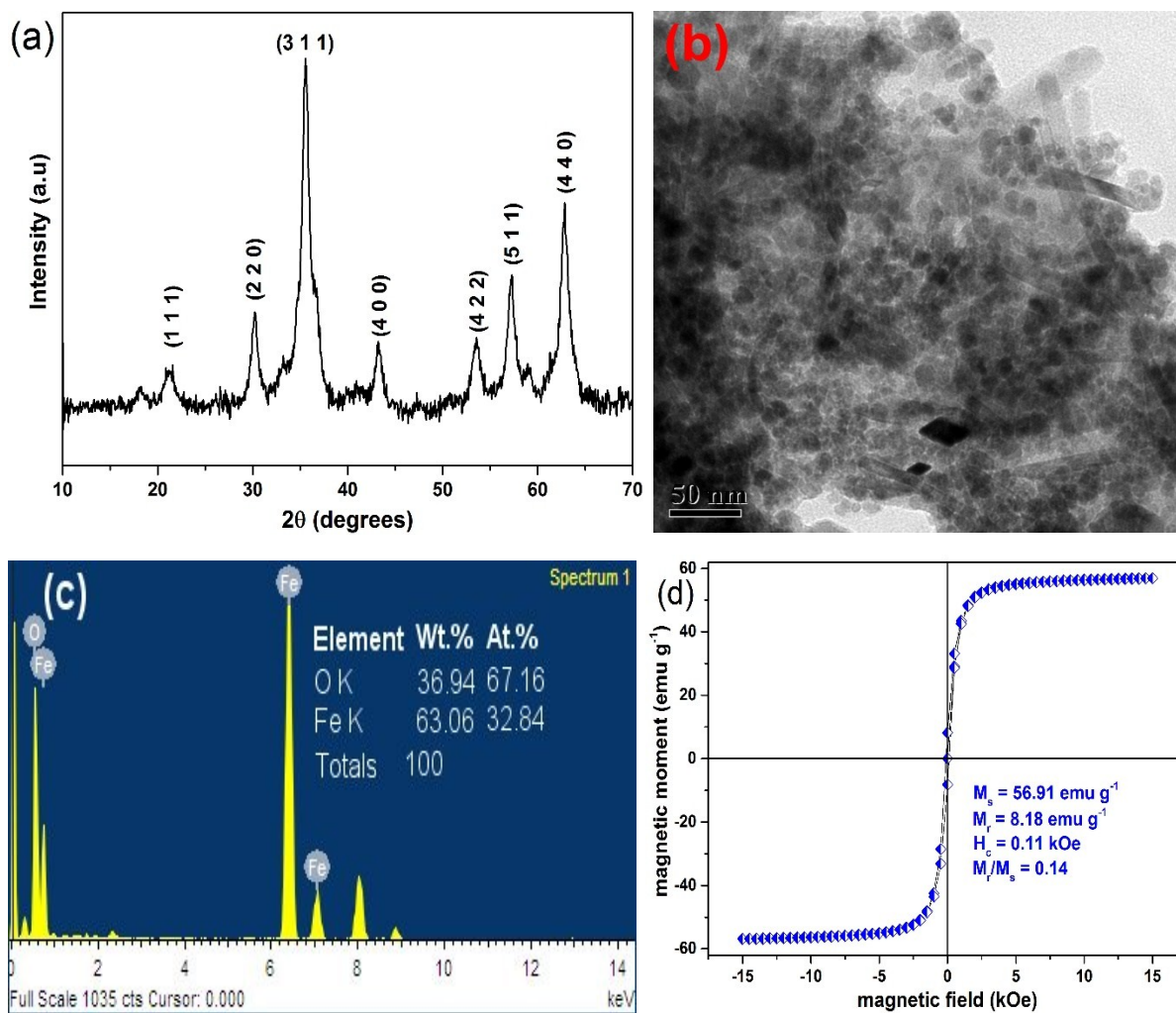
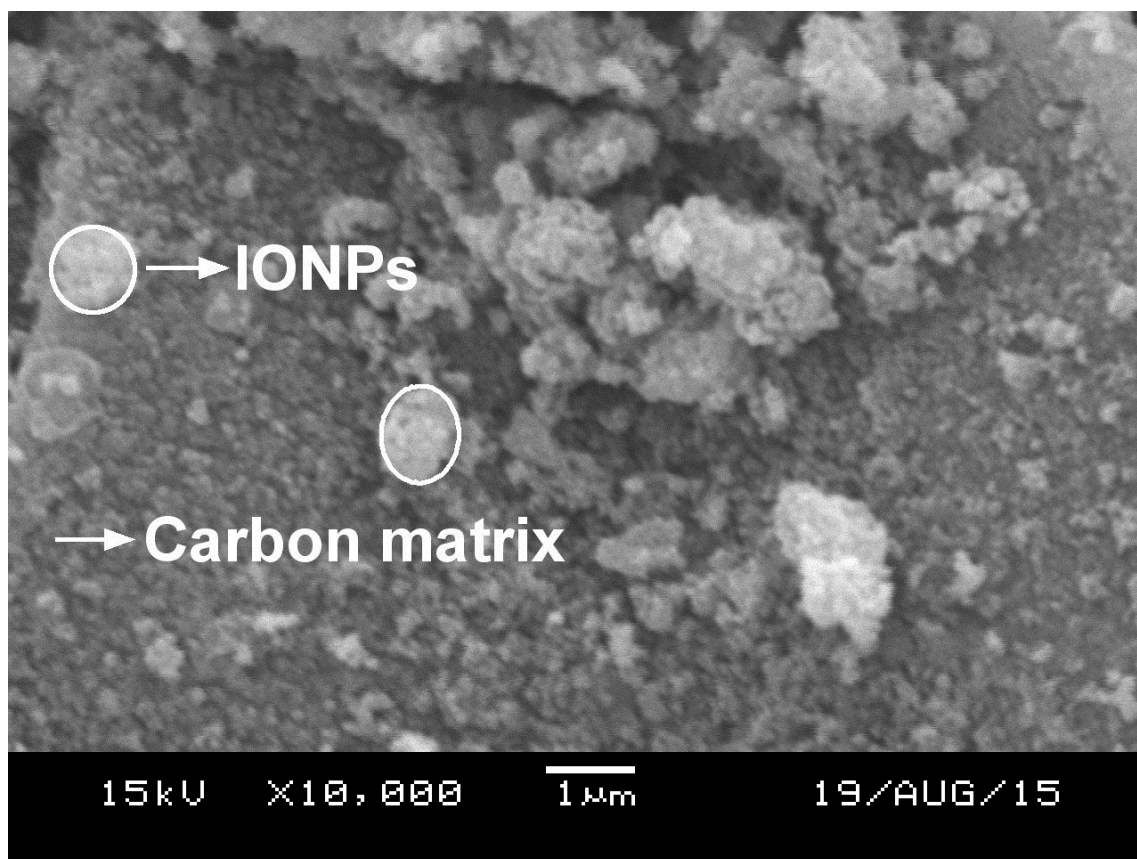
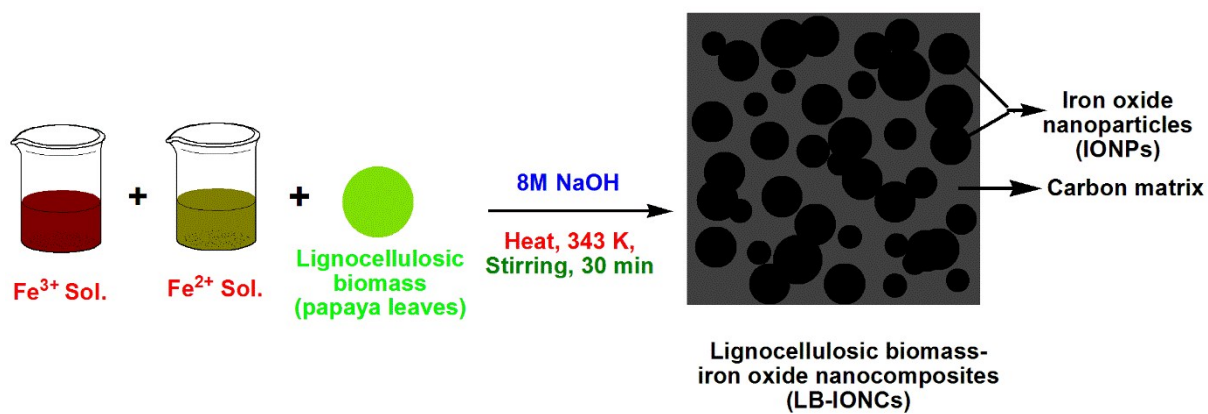


Fig. S2 (a) XRD pattern, (b) TEM image, (c) EDX spectrum, and (d) room temperature magnetization curve of the bare IONPs.



(a)



(b)

Fig. S3 (a) SEM image of the LB-IONC@773 and (b) schematic representation of the synthesized nanocomposites.

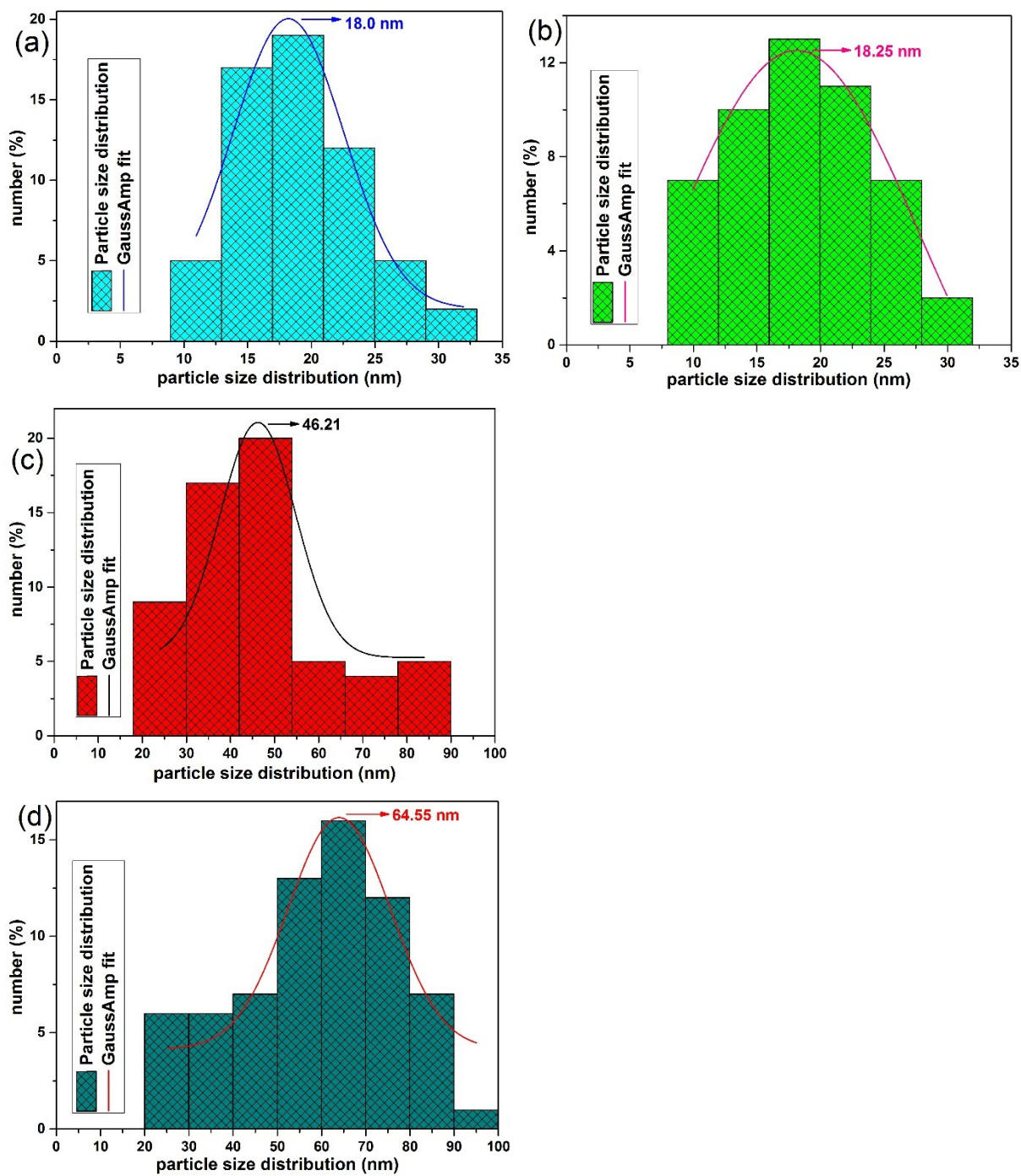


Fig. S4 Particle size distributions of the (a) LB-IONC@353, (b) LB-IONC@573, (c) LB-IONC@773 (before agglomeration), and (d) LB-IONC@773 (after agglomeration).

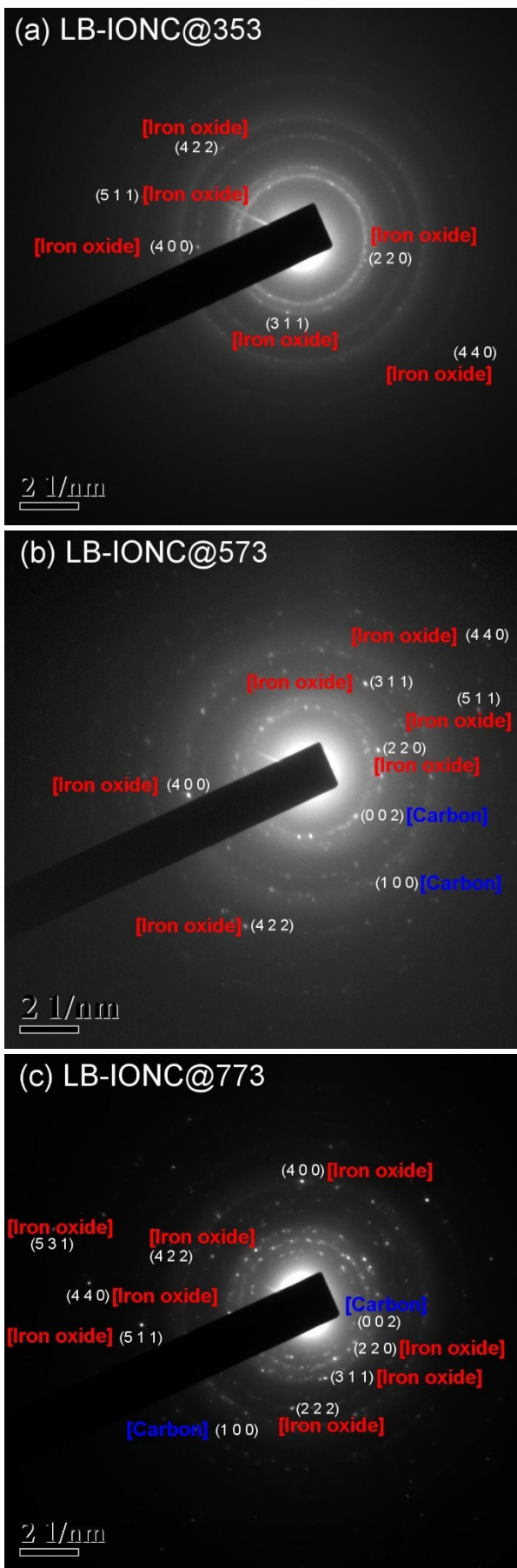


Fig. S5 SAED patterns (a-c) of the LB-IONCs.

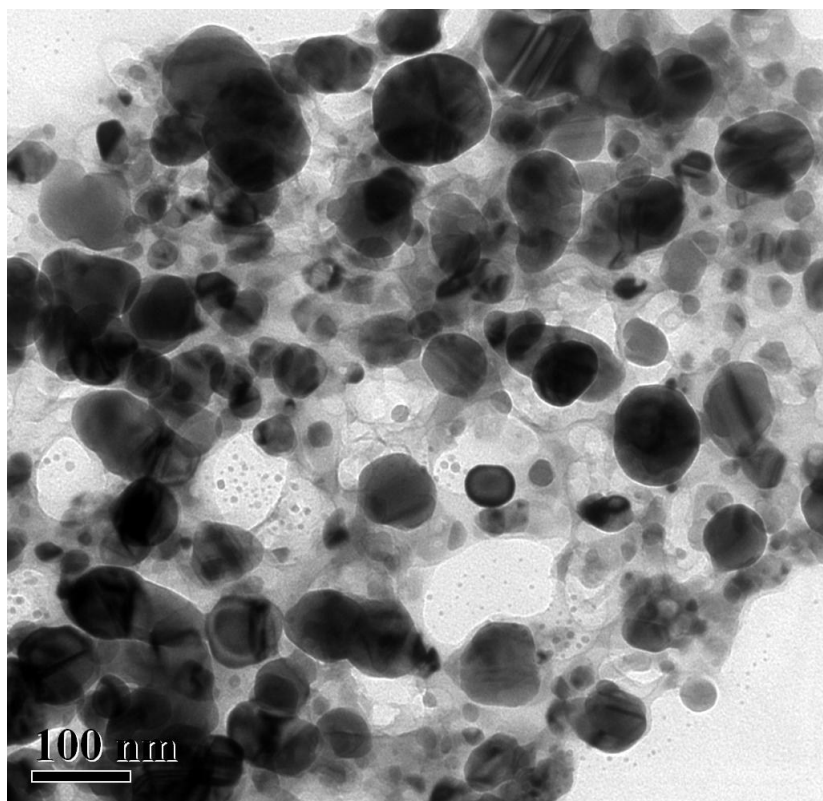


Fig. S6 TEM image of the LB-IONC@773, after removing from the aqueous dispersion.

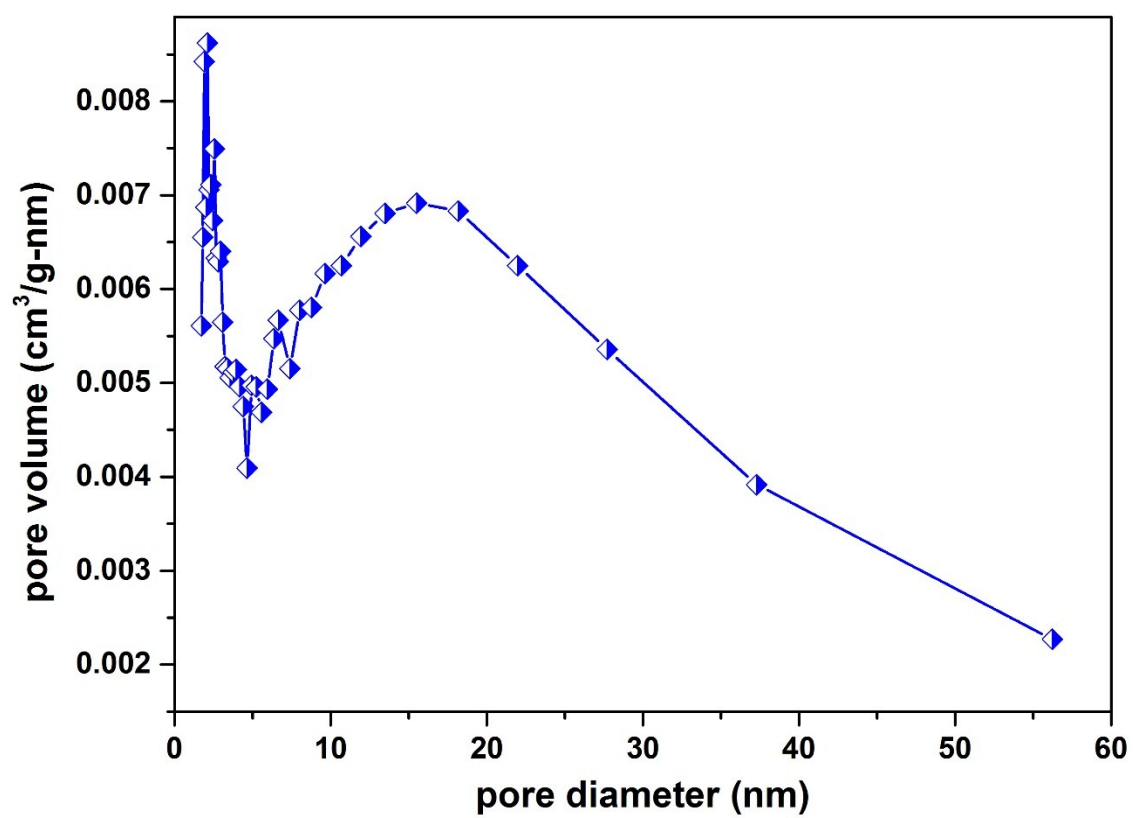


Fig. S7 Pore size distribution of the LB-IONC@773.

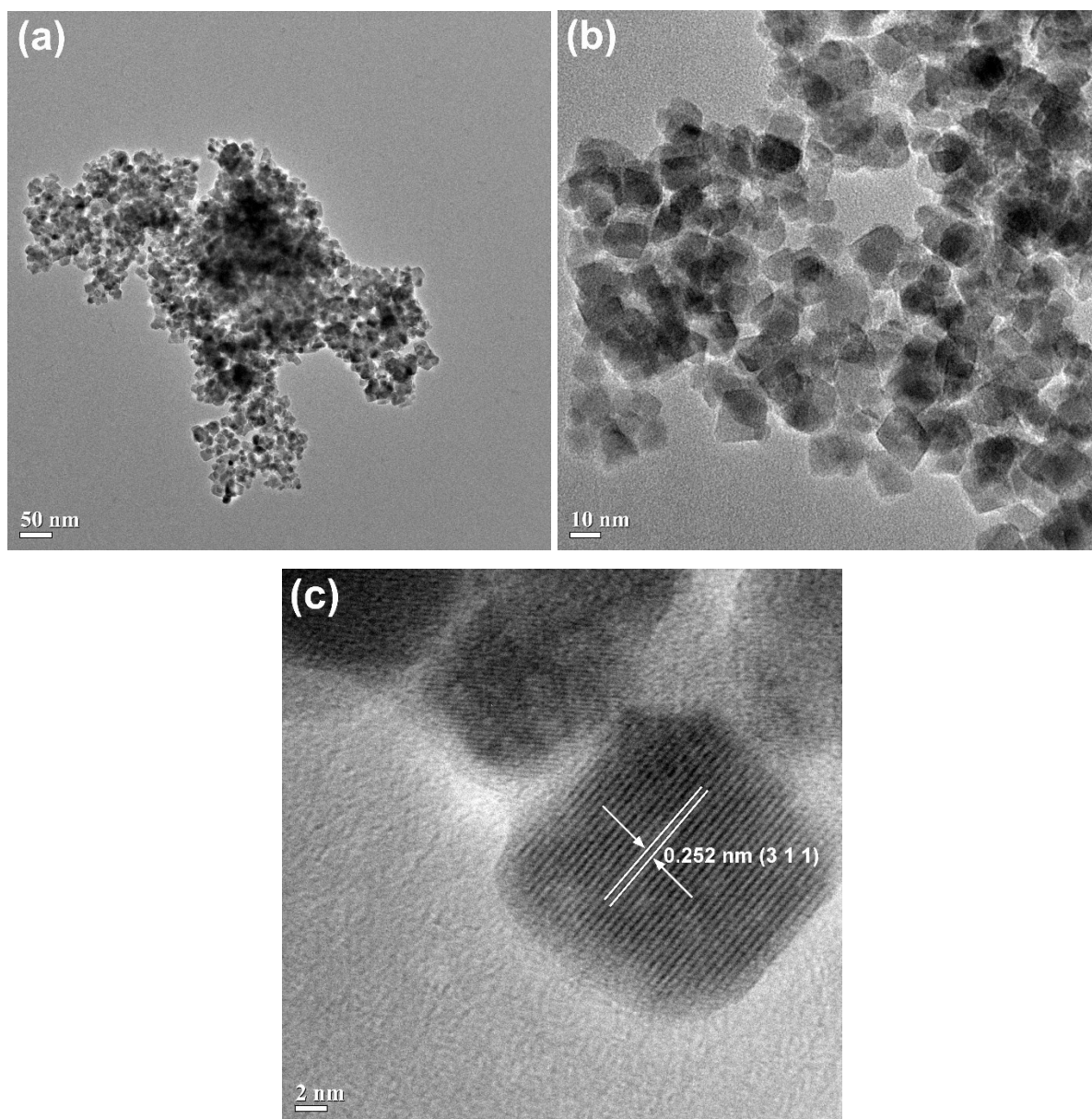
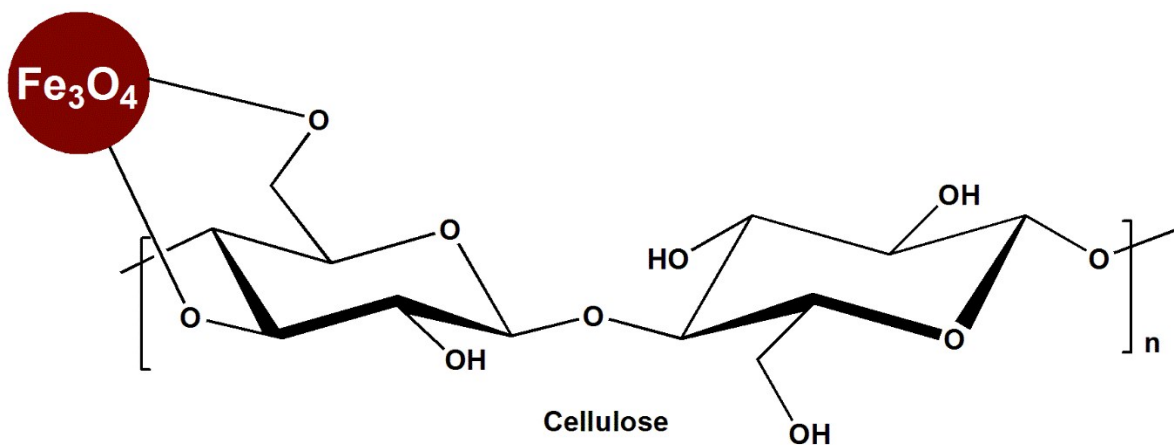
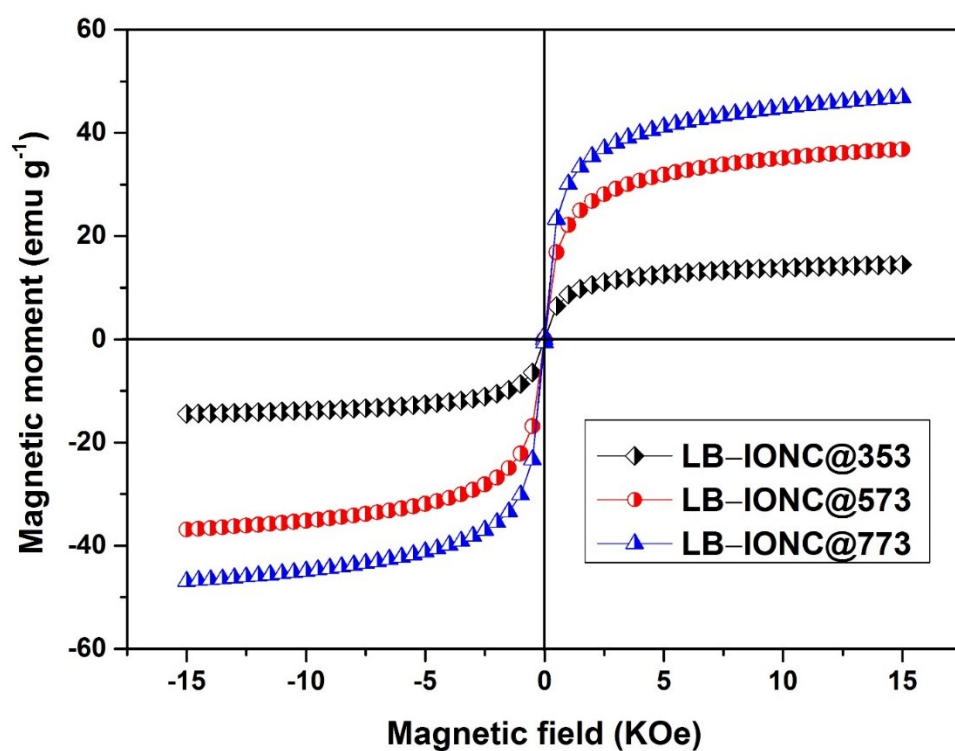


Fig. S8 TEM images of the LB-IONC@353 (Fe:LB = 2:1) at different scale bars (a) 100 nm, (b) 10 nm, and (c) 2 nm.



(a)



(b)

Fig. S9 (a) Plausible interaction of the cellulose of the LB with the IONPs in the formation of the LB-IONCs and (b) room temperature magnetization curves of the LB-IONCs.

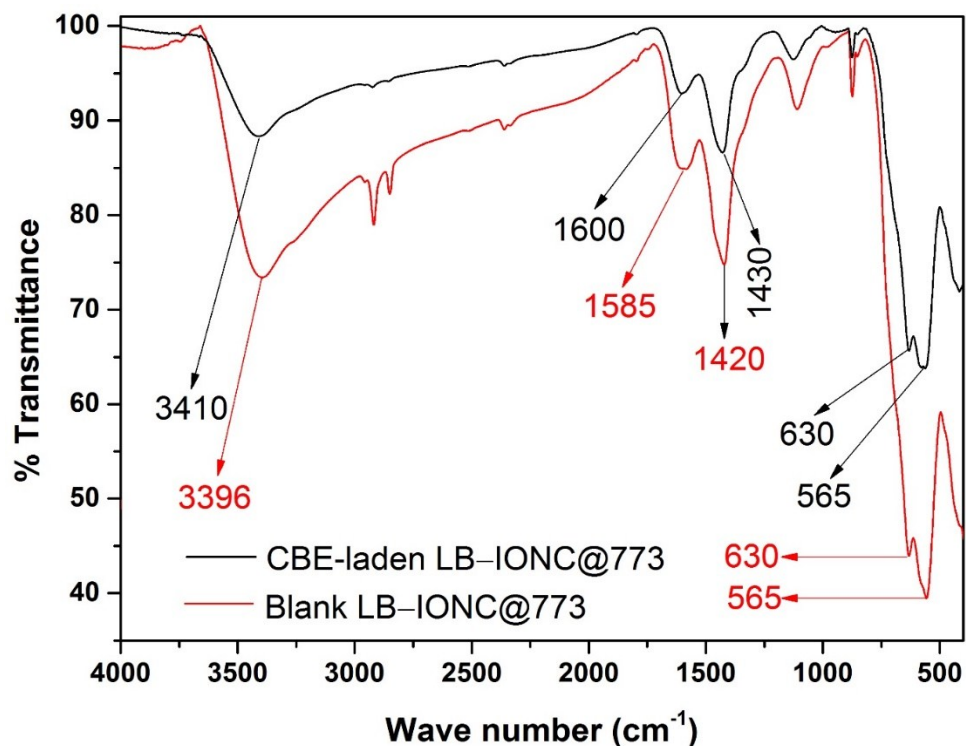


Fig. S10 FTIR spectra of the blank and the CBE-laden LB-IONC@773.

Table S1 Elemental compositions of the LB (papaya leaves) and the LB-IONCs.

Element (Wt. %)	LB (Batch 1)	LB (Batch 2)	LB-IONC@353	LB-IONC@573	LB-IONC@773
Carbon	40.65	40.9	36.93	34.74	30.55
Hydrogen	2.33	2.16	0.84	0.72	0.58
Nitrogen	0.85	0.91	0.25	0.00	0.00
Oxygen	38.69	38.85	41.67	36.45	33.11