Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Cellulose-based Dispersants and Flocculants

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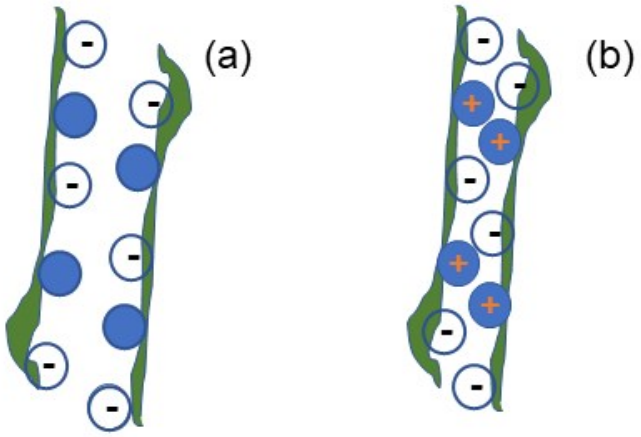

Figure S1. A schematic of (a) confinement stability and (b) confinement flocculation mechanisms of cellulosic particles. (a) Deposition of nanoparticles or adsorption of nonionic compounds on particles (such as nanocellulose), without eliminating the electrostatic repulsion between the particles results in stability of particles by confinement. Here fibers with confined compounds remain stable and the confined compounds are unable to flocculate due to confinement. (b) Charge neutralization of particles (such as nanocellulose) by dyes, ions, nanoparticles, etc. results in flocculation of particles by confinement. Here, nanocellulose is not a flocculant, but it is being flocculated by confined compounds.

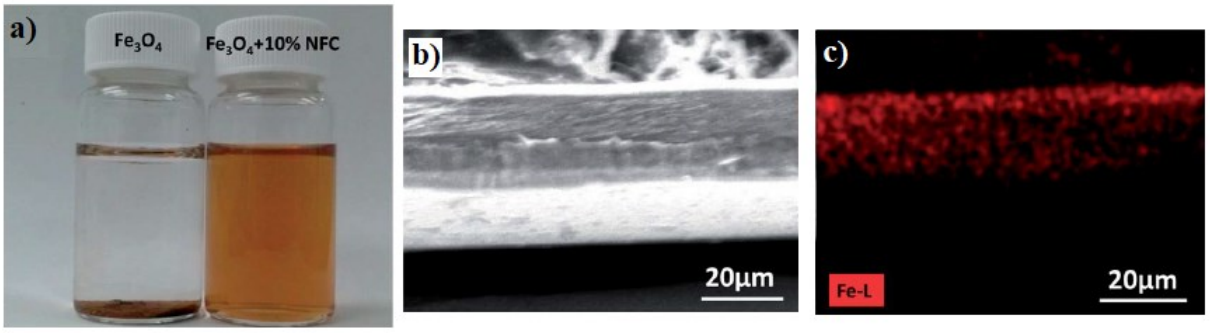

Figure S2. (a) Fe_3O_4 NP solution without (left) and with (right) CNF, after 20 days of preparation; (b) SEM image of CNF/Fe_3O_4 nanocomposite cross-section; and (c) Fe element mapping of nanocomposite cross-section. Adapted with permission form (Li *et al.*[1]). Copyright (2013) Royal Society of Chemistry.

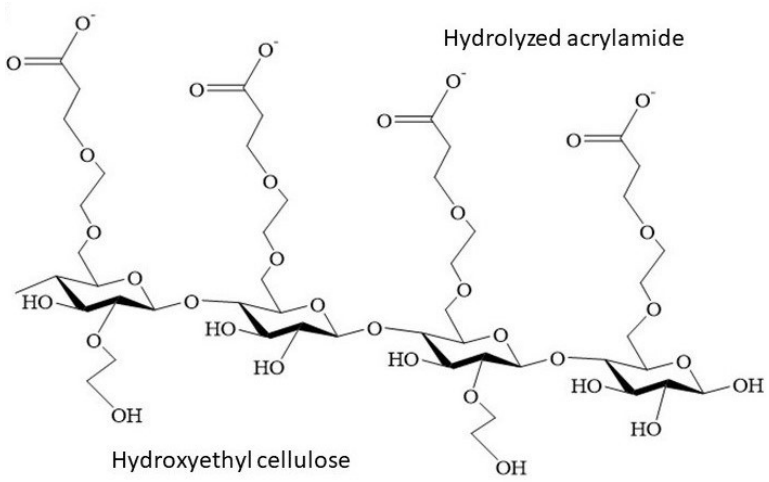

Figure S3. Chemical structure of water-soluble AM-graft-HEC copolymer. The flocculant was obtained by an unconventional reverse microemulsion procedure using water as ecofriendly solvent and as hydrogen transfer agent, in which cyclohexane was utilized as continuous phase to diminish the hydrophobicity of the medium. The grafting reaction was pursued by alkali saponification of amide groups to carboxylate form, increasing the negative charge density. Adapted with permission from (Chaouf et al. [2]). Copyright (2019) Elsevier.

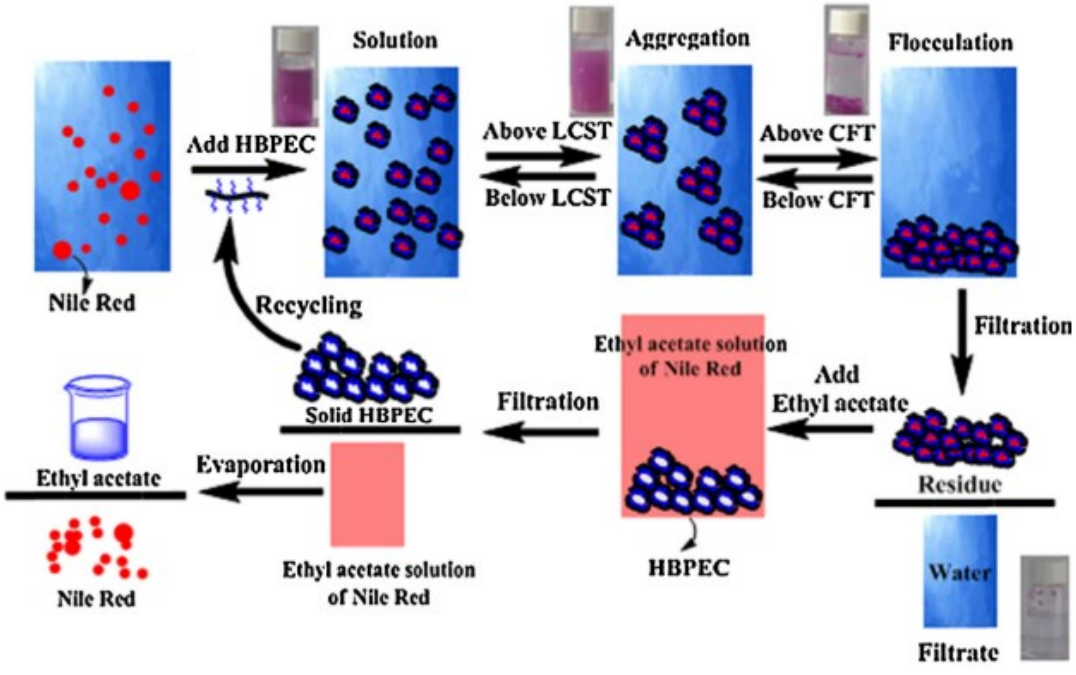

Figure S4: Schematic illustration of the process of discharging Nile Red using 2-hydroxy-3-butoxypropyl hydroxyethyl cellulose (HBPEC) as a thermo-responsive flocculant. Nile Red and other water insoluble

dyes can be encapsulated and stabilized in the hydrophobic core of amphiphilic HBPEC micelles via hydrophobic interaction. When the temperature of the HBPEC aqueous solution reaches to critical flocculation temperature, the dye particles, encapsulated in HBPEC micelles, is flocculated as a result of the aggregation of micelles and then is removed from the aqueous solution by a simple filtration. Adapted with permission from (Tian *et al.* [3]). Copyright (2016) Elsevier.

References

1. Y. Li, H. Zhu, H. Gu, H. Dai, Z. Fang, N. J. Weadock, Z. Guo and L. Hu, *Journal of Materials Chemistry A*, 2013, **1**, 15278-15283.
2. S. Chaouf, S. El Barkany, I. Jilal, Y. El Ouardi, M. Abou-salama, M. Loutou, A. El-Houssaine, H. El-Ouarghi, A. El Idrissi and H. Amhamdi, *Journal of Water Process Engineering*, 2019, **31**, 100807.
3. Y. Tian, B. Ju, S. Zhang and L. Hou, *Carbohydrate polymers*, 2016, **136**, 1209-1217.