

**Treatment of Hazardous Engineered Nanomaterials by Super-magnetized  $\alpha$ -Cellulose  
Fibers of Renewable Paper-waste Origin**

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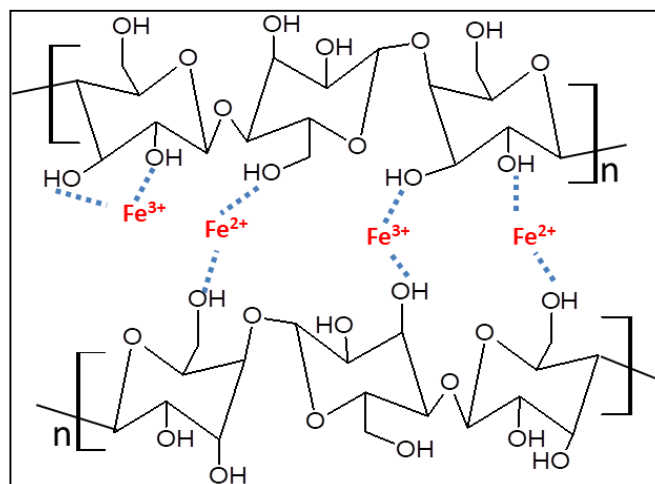
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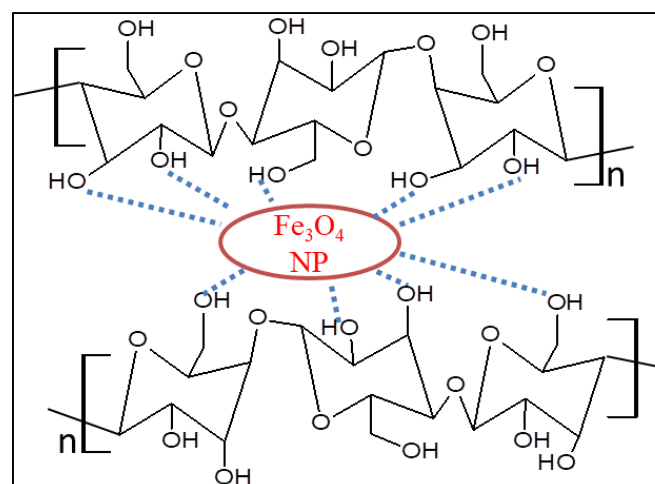
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Chelation of iron ions (Fe<sup>3+</sup> and Fe<sup>2+</sup>).

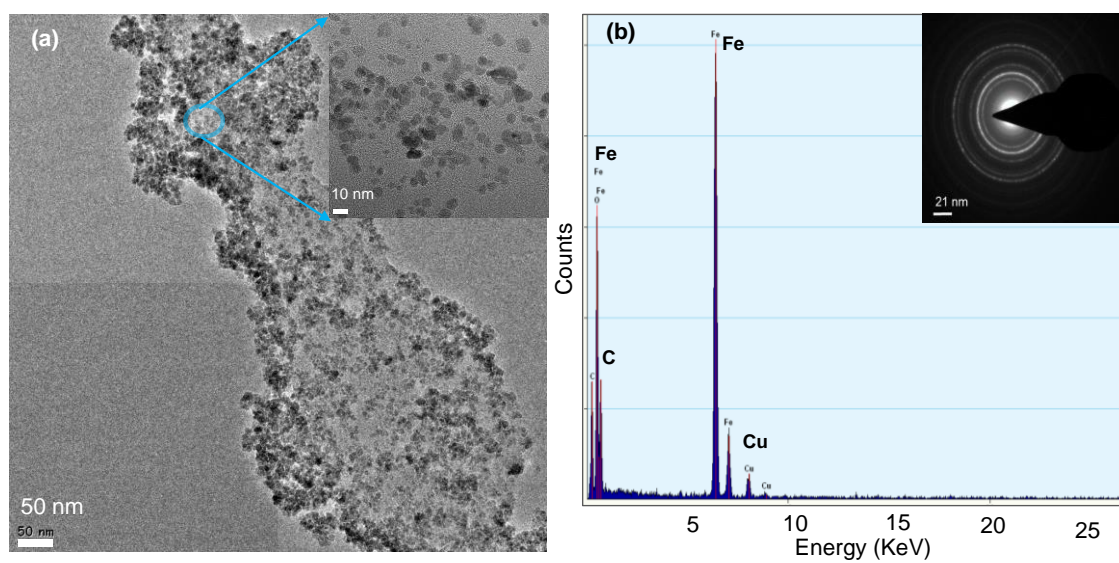


Co-precipitation

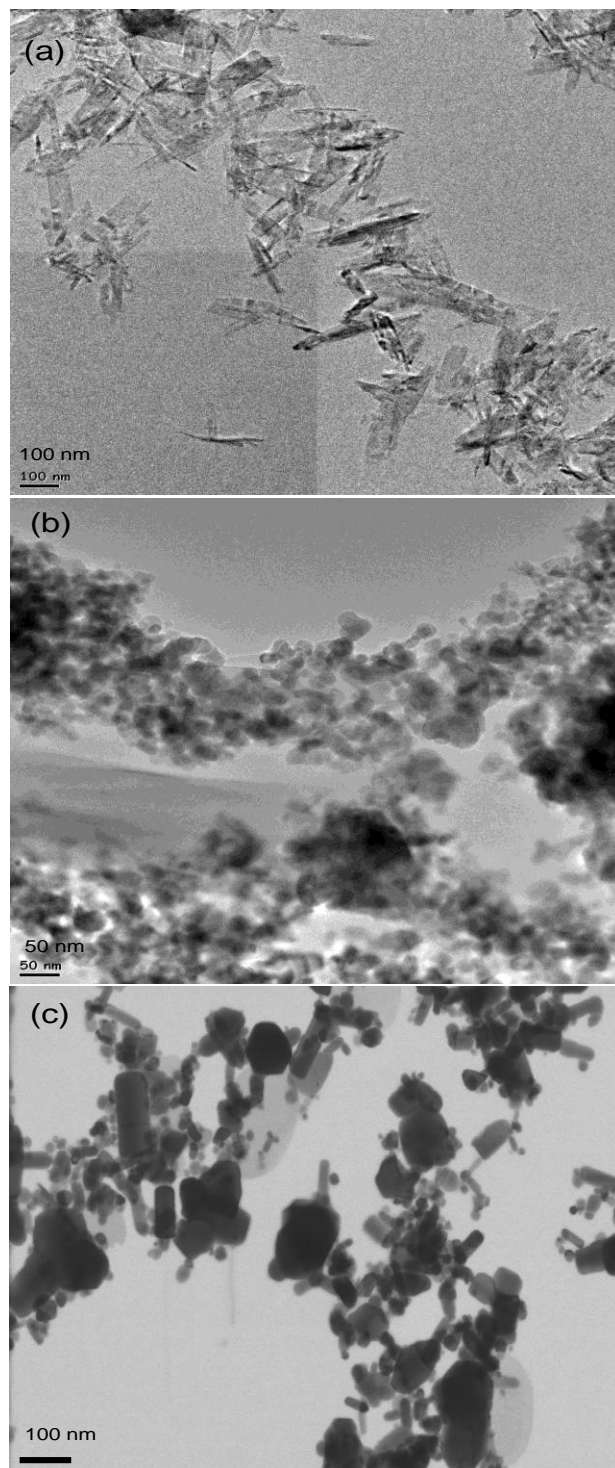


Formation of Fe<sub>3</sub>O<sub>4</sub> NPs on PW-αCFs

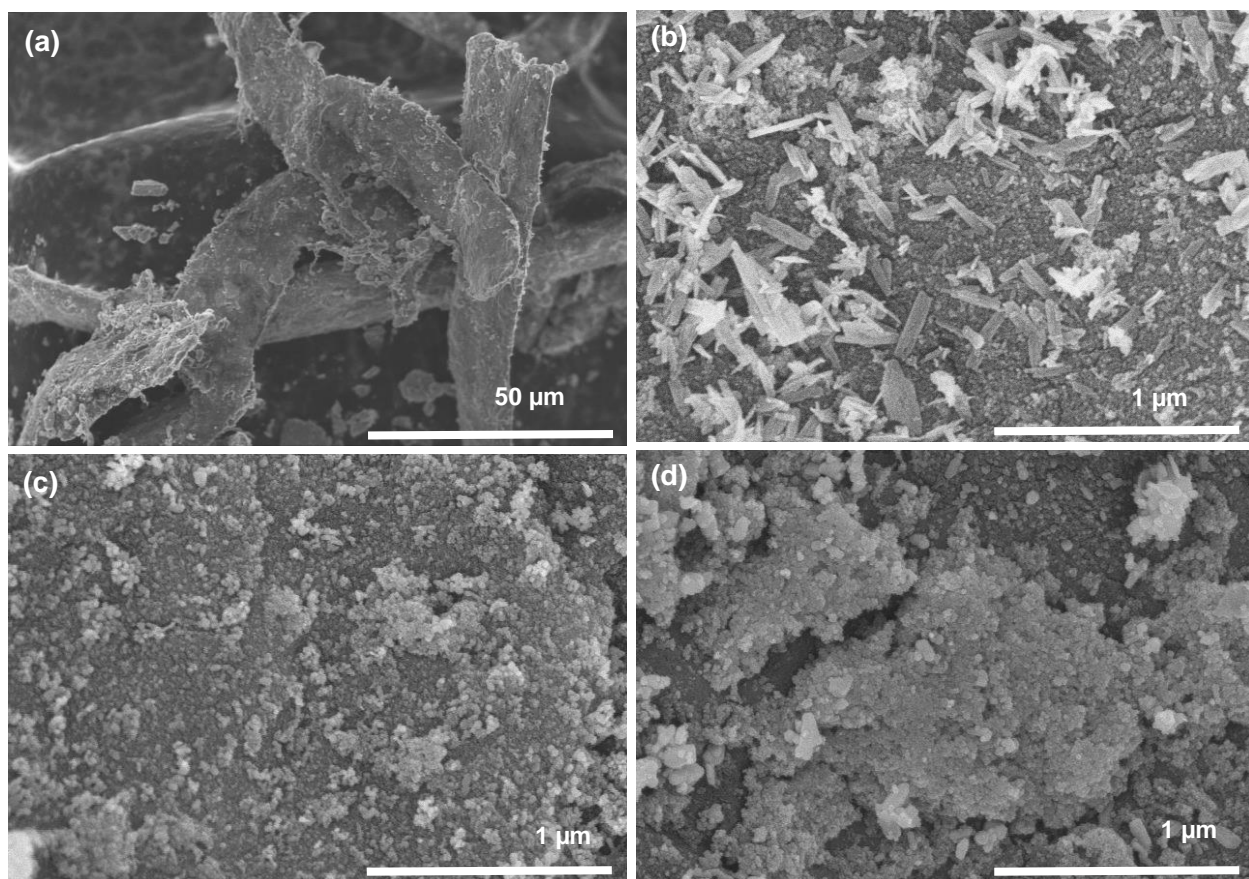
**Figure S1.** The schematic representation of the PW-αCFs magnetization.



**Figure S2.** Imaging of adsorbents, (a) FE-TEM imaging of  $\text{Fe}_3\text{O}_4@\text{PW}-\alpha\text{CFs}$  (inset, magnified view), (b) EDS spectrum of  $\text{Fe}_3\text{O}_4@\text{PW}-\alpha\text{CFs}$  (inset, SAED pattern).



**Figure S3.** (a) A representative TEM image of CuO, (b) Representative TEM image of CoO, (c) Representative TEM image of ZnO.



**Figure S4.** FE SEM imaging of the Fe<sub>3</sub>O<sub>4</sub>@PW-αCF surface, (a) Fe<sub>3</sub>O<sub>4</sub>@PW-αCF surface before the treatment, (b) Fe<sub>3</sub>O<sub>4</sub>@PW-αCF surface after the treatment of CuO, (c) Fe<sub>3</sub>O<sub>4</sub>@PW-αCF surface after the treatment of CoO, (d) Fe<sub>3</sub>O<sub>4</sub>@PW-αCF surface after the treatment of ZnO.