Supporting Information

Novel Pd based catalyst for the removal of organic and emerging contaminants

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Figure S1. The XRD pattern of control cellulose sample, coated with Polypyrrole. Red line- 2.882 M, blue line-1.441 M, and black line-0.2882 M of pyrrole used for the reaction.
Figure S2. The decoration of (a-b) Au nanoparticles on polypyrrole coated cellulose fibers, prepared using low concentration of pyrrole (0.2882 M)
Figure S3. The decoration of (a-b) Au nanoparticles on polypyrrole-coated cellulose fibers, prepared using a medium concentration of pyrrole (1.441 M).
Figure S4. SEM image of self-assembled Pd nanoparticles on cellulose nanofibers, prepared using a medium concentration of pyrrole (5 mL).

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<tr>
<th>Element</th>
<th>Weight%</th>
<th>Atomic%</th>
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<tr>
<td>C K</td>
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<td>67.62</td>
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<tr>
<td>N K</td>
<td>10.61</td>
<td>11.92</td>
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<tr>
<td>O K</td>
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<td>Pd L</td>
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<td>Au L</td>
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Table S1. EDS analysis of self-assembled Pd nanoparticles on cellulose nanofibers, prepared using a medium concentration of pyrrole (5 mL).
Figure S5. SEM image of self-assembled Pt nanoparticles on cellulose nanofibers, prepared using a high concentration of pyrrole (10 mL).

<table>
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<th>Compd%</th>
<th>Formula</th>
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Table S2. EDS analysis of self-assembled Pt nanoparticles on cellulose nanofibers, prepared using a high concentration of pyrrole (10 mL).
Figure S6. The decoration of Fe nanostructures on cellulose nanofibers, prepared using (a) 0.2882 M, (b) 1.441 M, and (c-d) 2.882 M of pyrrole.
<table>
<thead>
<tr>
<th>Element</th>
<th>Weight%</th>
<th>Atomic%</th>
<th>Compd%</th>
<th>Formula</th>
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Table S3. EDS analysis of self-assembled Fe nanoparticles on cellulose nanofibers, prepared using a high concentration of pyrrole (10 mL).
Figure S7. XRD pattern of Au nanostructures on polypyrrole-coated cellulose fibers prepared using (a) 0.2882 M, (b) 5, and (c) 2.882 M of pyrrole.
Figure S8. XRD patterns of Pd nanostructures on polypyrrole-coated cellulose fibers prepared using (a) 0.2882 M, (b) 1.441 M, and (c) 2.882 M of pyrrole.
Figure S9. XRD pattern of Pt nanostructures on polypyrrole-coated cellulose fibers prepared using (a) 0.2882 M, (b) 5, and (c) 2.882 M of pyrrole.
Figure S10. XRD patterns of iron nanoparticles formed on polypyrrole-coated cellulose fibers
Figure S11. SEM image of autocatalytic reduced Pd on 5 ml polypyrrole coated after cellulose fibers after microwave ignition for 1 minute.
Table S4. BET surface area of microwave ignited pre-selected morphology PdO$_2$

<table>
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<tr>
<th>Description</th>
<th>Value</th>
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<td>Single point surface area at P/Po = 0.299210665</td>
<td>59.6067 m$^2$/g</td>
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<td>BET Surface Area</td>
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<td>Langmuir Surface Area</td>
<td>101.3300 m$^2$/g</td>
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<td>t-Plot Micropore Area</td>
<td>4.5622 m$^2$/g</td>
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<tr>
<td>t-Plot External Surface Area</td>
<td>56.0518 m$^2$/g</td>
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<tr>
<td>BJH Adsorption cumulative surface area of pores between 17.000 Å and 3000.000 Å diameter</td>
<td>52.0934 m$^2$/g</td>
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<tr>
<td>BJH Desorption cumulative surface area of pores between 17.000 Å and 3000.000 Å diameter</td>
<td>64.8865 m$^2$/g</td>
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<tr>
<td>Single point adsorption total pore volume of pores less than 2330.929 Å diameter at P/Po = 0.991644095</td>
<td>0.112058 cm$^3$/g</td>
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<tr>
<td>t-Plot micropore volume</td>
<td>0.002351 cm$^3$/g</td>
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<tr>
<td>BJH Adsorption cumulative volume of pores between 17.000 Å and 3000.000 Å diameter</td>
<td>0.107117 cm$^3$/g</td>
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<tr>
<td>BJH Desorption cumulative volume of pores between 17.000 Å and 3000.000 Å diameter</td>
<td>0.108777 cm$^3$/g</td>
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<tr>
<td>Adsorption average pore width (4V/A by BET)</td>
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<tr>
<td>BJH Adsorption average pore diameter (4V/A)</td>
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<td>BJH Desorption average pore diameter (4V/A)</td>
<td>67.057 Å</td>
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