Supporting Information

Inkpen-printed reusable colorimetric sensors for detection of Hg(II)

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Scheme S1 Synthetic pathways of branched poly(L-lactide)-maltitol (B-PLLA-M)

Figure S1. $^1$H NMR spectra of branched poly(L-lactide)-maltitol

Figure S2. FTIR spectra of branched poly(L-lactide)-maltitol

Figure S3. TGA curves of branched poly(L-lactide)-maltitol

Figure S4. The variation weigh ratio of the composition of the binder (branched poly(L-lactide)-maltitol) and the chemosensor (L2) in the present of Hg$^{2+}$ 10 μM in acetone solution; $\lambda_{ex}$= 520 nm, $\lambda_{em}$= 580 nm.

Table S1. Solubility properties of mixing components (branched poly(L-lactide)-maltitol) 0.17 g and the chemosensor (L2) 0.21 g in various solvent.

Figure S5. A facile pen-on-paper paradigm of inkpen-printed based reversible biodegradable-colorimetric sensor (IRBS)

Figure S6. The cross-sectional SEM images of IRBS on paper (a, b) before and (c, d) after addition of Hg$^{2+}$.

Figure S7. Fluorescence imaging observation of IRBS paper sensor before and after treated with Hg$^{2+}$ ion solutions of various concentrations (4.0 ×10$^{-8}$ M to 1.0 ×10$^{-6}$ M).

Figure S8. The response calibration curves of the IRBS paper sensors for detection of Hg$^{2+}$ (average responses and standard deviation for n = 3 paper sensors).
Scheme S1. Synthetic pathways of branched poly(L-lactide)-maltitol (B-PLLA-M)

Figure S1. 1H NMR spectra of branched poly(L-lactide)-maltitol
Figure S2. FTIR spectra of branched poly(L-lactide)-maltitol

Figure S3. TGA curves of branched poly(L-lactide)-maltitol
Figure S4. The variation weigh ratio of the composition of the binder (branched poly(L-lactide)-maltitol) and the chemosensor (L2) in the presence of Hg$^{2+}$ 10 μM in acetone solution; $\lambda_{ex}$= 520 nm, $\lambda_{ex}$= 580 nm.

Table S1. Solubility properties of mixing components (branched poly(L-lactide)-maltitol) 0.17 g and the chemosensor (L2) 0.21 g in various solvent.

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Mixing components</th>
</tr>
</thead>
<tbody>
<tr>
<td>H$_2$O</td>
<td>insoluble</td>
</tr>
<tr>
<td>Acetone</td>
<td>soluble</td>
</tr>
<tr>
<td>Acetonitrile</td>
<td>partially soluble</td>
</tr>
<tr>
<td>Chloroform</td>
<td>soluble</td>
</tr>
<tr>
<td>Diethyl ether</td>
<td>insoluble</td>
</tr>
<tr>
<td>Dimethylformamide</td>
<td>soluble</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>partially soluble</td>
</tr>
<tr>
<td>Hexane</td>
<td>insoluble</td>
</tr>
<tr>
<td>Toluene</td>
<td>soluble</td>
</tr>
<tr>
<td>Tetrahydrofuran</td>
<td>soluble</td>
</tr>
<tr>
<td>Pyridine</td>
<td>soluble</td>
</tr>
</tbody>
</table>
1) mixing of three-component
2) filling ink in highlighter pen
3) direct writing on ordinary paper
4) dipping in an aqueous solution of Hg$^{2+}$
5) measuring the greenish color intensity using Adobe Photoshop

**Figure S5.** A facile pen-on-paper paradigm of inkpen-printed based reversible biodegradable-colorimetric sensor (IRBS)
Figure S6. The cross-sectional SEM images of IRBS on paper (a, b) before and (c, d) after addition of Hg$^{2+}$. 
Figure S7. Fluorescence imaging observation of IRBS paper sensor before and after treated with Hg$^{2+}$ ion solutions of various concentrations (4.0 $\times$ 10$^{-8}$ M to 1.0 $\times$ 10$^{-4}$ M).

Figure S8. The response calibration curves of the IRBS paper sensors for detection of Hg$^{2+}$ (average responses and standard deviation for n = 3 paper sensors).