SUPPORTING INFORMATION

Synthesis and characterization of carboxylated polybenzimidazole and its use as a highly sensitive and selective enzyme-free H$_2$O$_2$ sensor

Mu-Yi Hua,*a,b Hsiao-Chien Chen,a,b Rung-Ywan Tsai,c Yann-Lii Leu,d Yin-Chih Liu*a,b and Jinn-Tsyy Lai*e

a Green Technology Research Center, Department of Chemical and Materials Engineering, Chang Gung University, Tao-Yuan 33302, Taiwan, R.O.C. Tel: +886-3-2118800; Fax: +886-3-2118668; E-mail: huamy@mail.cgu.edu.tw

b Biosensor Group, Biomedical Engineering Research Center, Chang Gung University, Tao-Yuan 33302, Taiwan, R.O.C.

c Electronics and Optoelectronics Research Laboratories, Industrial Technology Research Institute, Hsinchu 31040, Taiwan, R.O.C.

d Natural Products Laboratory, Graduate Institute of Natural Products, Chang Gung University, Tao-Yuan 33302, Taiwan, R.O.C.

e Food Industry Research and Development Institute, Hsinchu 30062, Taiwan, R.O.C.
<table>
<thead>
<tr>
<th></th>
<th>Imine</th>
<th>Amine</th>
<th>N-substituted amine</th>
<th>Protonated imine</th>
<th>Oxidized imine</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBI</td>
<td>49%</td>
<td>51%</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>PBI–BA</td>
<td>44%</td>
<td>29.5%</td>
<td>20.5%</td>
<td>6%</td>
<td>–</td>
</tr>
<tr>
<td>PBI–BA N-oxide</td>
<td>35%</td>
<td>29.5%</td>
<td>20.5%</td>
<td>6%</td>
<td>9%</td>
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</tbody>
</table>

–: Data not available.
Fig. S-1 WAXS patterns of (a) PBI and (b) PBI-BA from 5°–35° at a scan rate of 1 °/min.
Fig. S-2 Linear relationships of (A) peak current vs. the square root of \( \nu \) and (B) peak potential vs. the natural logarithm of \( \nu \) for a PBI-BA/Au electrode at pH 7.0. (■: 1st oxidation peak; ○: 1st reduction peak; ▲: 2nd oxidation peak; ▼: 2nd reduction peak)
Fig. S-3 CVs of a PBI-BA/Au electrode in the presence of (a) 0, (b) 1, (c) 3, and (d) 10 mM H₂O₂.
**Fig. S-4** Current response of a PBI-BA/Au electrode at an applied potential of −0.5 V using various stirring rates.
Fig. S-5 The FT–IR spectra of PBI-BA treated thermally at 100 °C for (a) 0, (b) 1, (c) 5, (d) 7 and (e) 10 days.
The CVs of Gs/Au (a and b) and PBI-BA–Gs/Au (c and d) electrodes in the absence (a and c) and presence (b and d) of 1 mM $\text{H}_2\text{O}_2$. 

**Fig. S-6**