Supporting Information

Facile synthesis of thiazole-functionalized magnetic microspheres for highly specific separation of heme proteins

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Fig. S1 HRTEM image of Fe₃O₄ microspheres

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The diffraction peaks (2θ=30.1°, 35.5°, 43.1°, 53.4°, 57.0° and 62.6° ) for Fe₃O₄, Fe₃O₄@SiO₂, Fe₃O₄@SiO₂@AT were indexed as (220), (311), (400), (422), (511) and (440), respectively. The positions of these peaks matched well with database for magnetite in the JCPDS-International Center for Diffraction Data (JCPDS Card: 19-629) file. The XRD patterns indicated that the Fe₃O₄ crystalline structure did not change before and after each step of the chemical modification reaction.

Fig. S3 The size-distribution analysis of Fe₃O₄@SiO₂@AT with a log-normal fit
Fig. S4 Raman spectra of Fe$_3$O$_4$ microspheres

Fig. S5 Zeta potentials of Fe$_3$O$_4$@SiO$_2$@AT in different pH solutions

Fig. S6 The use of the recycled Fe$_3$O$_4$@SiO$_2$@AT for hemoglobin adsorption
The result of recycle experiment was shown in Fig. S6. The hemoglobin adsorption-desorption process was repeatedly used for 6 cycles, and the adsorption efficiency was still maintained at 85%. It indicated that the prepared microspheres were very stable for separation of hemoglobin.

![Figure S7](image)

**Fig. S7 N\textsubscript{2} adsorption/desorption isotherms (at 77K) and the pore size distribution curves (inset) of the Fe\textsubscript{3}O\textsubscript{4}@SiO\textsubscript{2}@AT and Fe\textsubscript{3}O\textsubscript{4}@SiO\textsubscript{2}@IL composite**

**Table S1 Properties of different adsorbents for hemoglobin capture**

<table>
<thead>
<tr>
<th>Adsorption material</th>
<th>Size</th>
<th>Capacity for hemoglobin</th>
<th>Capture time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesoporous silica\textsuperscript{42}</td>
<td>50 and 10 µm (pore diameters from 6 to 20 nm)</td>
<td>300 mg/g</td>
<td>30 min</td>
</tr>
<tr>
<td>Mesoporous TiO\textsubscript{2}–SiO\textsubscript{2}\textsuperscript{63}</td>
<td>Wall thickness ~5 nm (pore diameters from 5.8 to 7.25 nm)</td>
<td>301.8 mg/g</td>
<td>12 h</td>
</tr>
<tr>
<td>Fe\textsubscript{3}O\textsubscript{4}@SiO\textsubscript{2}@IL (previous work)\textsuperscript{69}</td>
<td>~300 nm (pore diameter 13.71 nm)</td>
<td>~2.0 g/g</td>
<td>15 min</td>
</tr>
<tr>
<td>Fe\textsubscript{3}O\textsubscript{4}@SiO\textsubscript{2}@AT (This work)</td>
<td>322 nm (pore diameter 11.6 nm)</td>
<td>2.02 g/g</td>
<td>15 min</td>
</tr>
</tbody>
</table>

**References**

