The tensile strength and strain curve of the GO/PVA

![Tensile strength and strain curve](image)

Fig. S1 - The tensile strength and strain curve of the GO/PVA with 0.8 wt% GO loading.

**TGA and DSC analysis**

TGA is a commonly used method to test the composition and thermal stability of composite materials. The TGA diagrams of PVA and GO/PVA composite with 0.8 wt% GO are shown in Fig. S2. The curves were obtained by heating the samples to 800 °C at a rate of 6 °C /min under a nitrogen atmosphere. Both pure PVA and the composite show a two-step decomposition: a large mass loss starting below 100 °C, presumably due to the elimination of the residual water in the PVA matrix; and a small loss at about 220 °C, presumably due to the decomposition of functional groups and carbonization. The two TGA curves practically overlap however the curve of the composite is shifted toward a slightly higher temperature compared to that of the pure PVA. This
indicates that the addition of GO at low concentration slightly improved the thermal stability of the composite.

Fig. S2 - TGA curves of pure PVA and GO/PVA composite with 0.8 wt% loading.

DSC was used to measure the melting enthalpy of the samples and the results are shown in Fig. S3. The melting peaks are all in the temperature range of 240–270 °C, which indicates that the GO has no apparent effect on the melting behavior of PVA hydrogels.
Fig. S3 - Melting peaks of PVA and GO/PVA hydrogels with 0.4 wt% and 0.8 wt% GO.

The density of each tested sample

Table S1 - The density of each tested sample

<table>
<thead>
<tr>
<th>GO content (wt%)</th>
<th>0.0</th>
<th>0.4</th>
<th>0.6</th>
<th>0.8</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (g/cm³)</td>
<td>1.0392</td>
<td>1.0345</td>
<td>1.0311</td>
<td>1.0289</td>
<td>1.0274</td>
</tr>
</tbody>
</table>