Supporting Information

Multi-stimuli responsive smart elastomeric hyperbranched polyurethane/
reduced graphene oxide nanocomposites

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\[ E_{NC} = E_p \left[ \frac{3 \ 1 + \eta_L \zeta V_C}{8 \ 1 - \eta_L V_C} + \frac{5 \ 1 + 2\eta_T V_C}{8 \ 1 - \eta_T V_C} \right] \] (1)

\[ E_{\parallel} = E_p \left[ \frac{1 + \eta_L \zeta V_C}{1 - \eta_L V_C} \right] \] (2)

\[ \eta_L = \frac{(E_{RGO}/E_p) - 1}{(E_{RGO}/E_p) + \zeta} \] (3)

\[ \eta_T = \frac{(E_{GO}/E_p) - 1}{(E_{GO}/E_p) + 2} \] (4)

Where \( E_p, E_{RGO}, E_{NC} \) and \( E_{\parallel} \) are young’s modulus of HBPU, RGO, nanocomposites with randomly distributed RGO and aligned parallel to the surface of the sample, respectively. \( \zeta \) and \( V_C \) are diameter to thickness ratio and volume fraction of RGO, respectively. The parameters implemented in the calculation are determined as follows.\(^1\,^2\)
Fig. S1 UV-visible spectra of aqueous phytoextract, Fe$^{3+}$ solution and their complex.
Table S1 Crystalinity of HPU and HPU/ RGO nanocomposites

<table>
<thead>
<tr>
<th>Sample</th>
<th>T&lt;sub&gt;m&lt;/sub&gt; (°C)</th>
<th>Crystallinity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPU</td>
<td>48.3</td>
<td>26.60</td>
</tr>
<tr>
<td>HPU/RGO0.5</td>
<td>50.3</td>
<td>29.25</td>
</tr>
<tr>
<td>HPU/RGO1.5</td>
<td>51.2</td>
<td>33.56</td>
</tr>
<tr>
<td>HPU/RGO2.5</td>
<td>52.7</td>
<td>34.39</td>
</tr>
</tbody>
</table>

Reference