Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Light- and Magnetic-Responsive Synergy Controlled Reconfiguration of Polymer Nanocomposites with Shape Memory Assisted Self-Healing Performance for Soft Robotics

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Supplementary Figures:

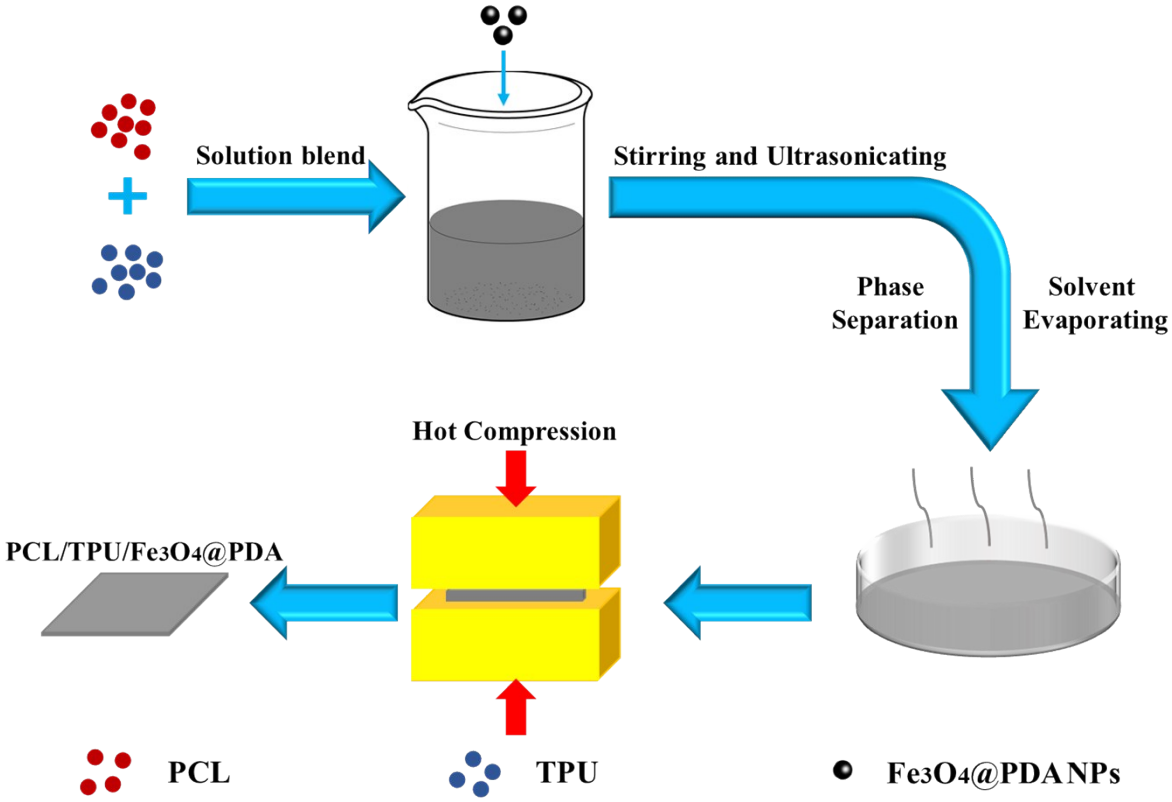

Figure S1. Schematic diagrams of the fabrication process for PCL/TPU/Fe_3O_4@PDA nanocomposites.

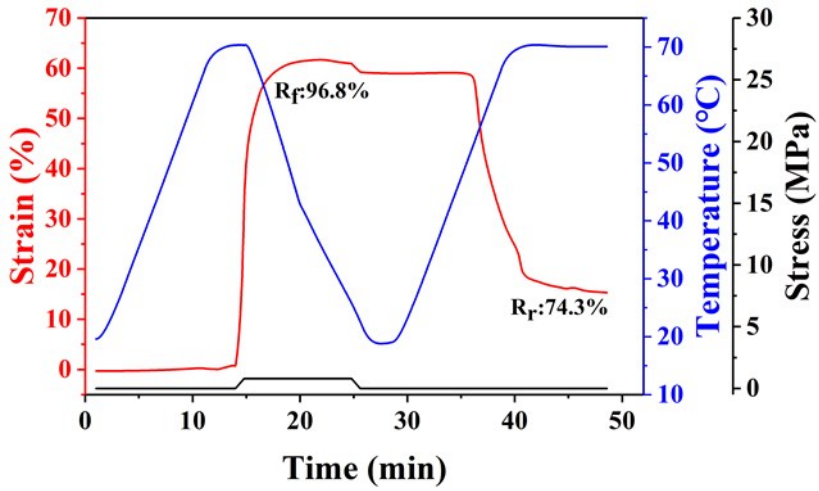

Figure S2. The details of evolution of strain, stress, and temperature during the thermomechanical cycle of PCL/TPU blend.

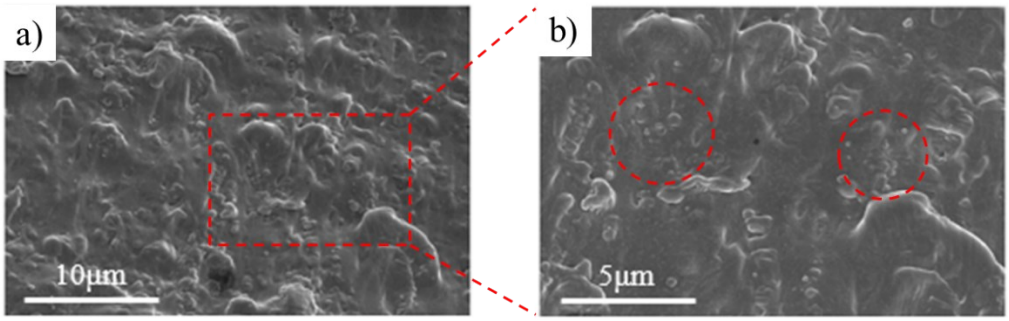

Figure S3. (a) (b) SEM images of PCL/TPU/Fe_3O_4 nanocomposite for fracture morphology.

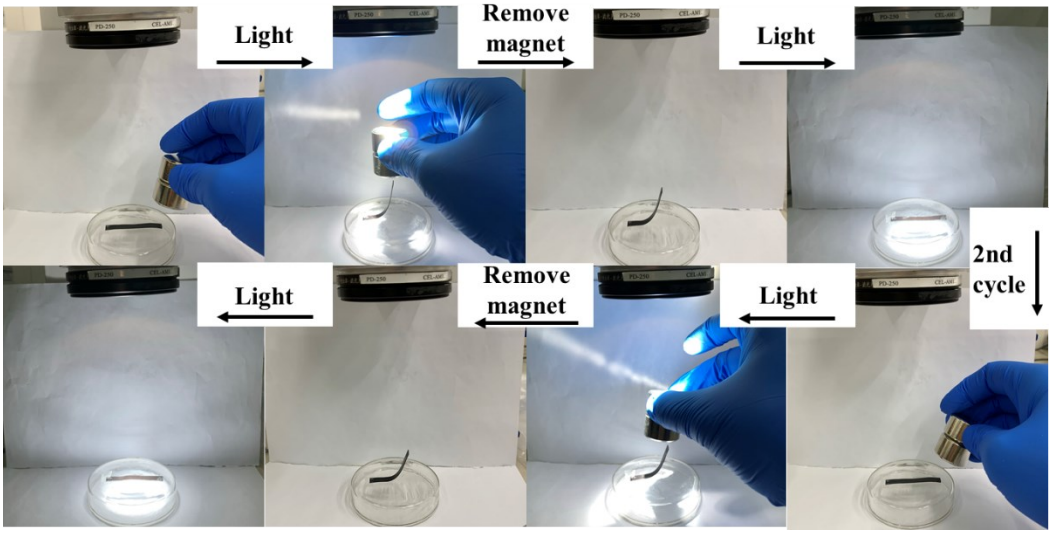

Figure S4. The snapshots of light-and magnetic- responsive controlled reconfiguration.

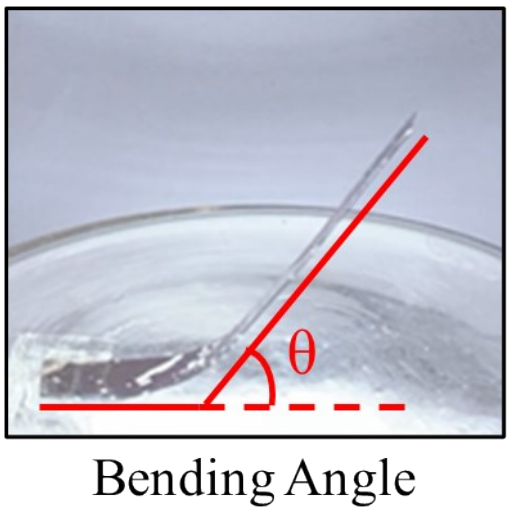

Figure S5. Measurement of bending angle of the nanocomposite film (length of the bending curved arc is 8mm).

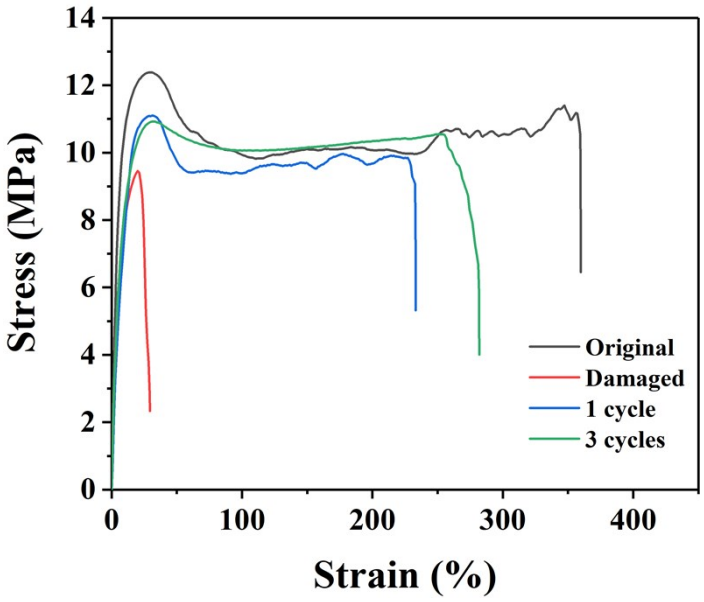

Figure S6 The stress-strain curves of original, damaged and 1&3 healing cycles specimens.

Supplementary Table:

Table.S1 Data of bending angle and the relevant parameter of curvature.

Magnetic-response			Light-response		
t/s	angle/°	curvature	t/s	angle/°	curvature
0	0	0	0	90	11.25
0.1	5	0.625	0.5	88	11
0.2	11	1.375	1	86	10.75
0.3	20	2.5	1.5	83	10.375
0.4	34	4.25	2	78	9.75
0.5	50	3.75	2.5	72	9
0.6	63	7.785	3	64	8
0.7	75	9.375	3.5	52	6.5
0.8	83	10.375	4	35	4.375
0.9	88	11	4.5	18	2.25
1.0	90	11.25	5	0	0

The calculation process of curvature is shown as follows:

$$\text{curvature} = \frac{\Delta\alpha}{\Delta s}$$

where Δα is bending angle. In actual engineering design problems, a section of arc adjacent to the bending point is often used to approximate the curved arc to simplify the problem. Therefore, the Δs is length of bending arc, and the approximate value is 8 mm here.

Supplementary Videos:

Video. S1 Light-responsive shape recovery progress of the PCL/TPU/Fe_3O_4@PDA nanocomposite.

Video. S2 Light- and magnitic-responsive synergy controlled reconfiguration and reversible shape transformation progress of the PCL/TPU/Fe_3O_4@PDA nanocomposite in a cantilever experiment.