Supporting Information

Recyclable and In-situ Repairable 3D Printing via Direct Ink Writing of Photothermal Disulfide-based Polyurethane

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Table S1. Young's modulus, tensile strength at break, and elongation at break of PU S-S samples.

Content of MWCNTs-OH (wt%)	Young's Modulus (MPa)	Tensile Strength at Break (MPa)	Elongation at Break (%)
0	6.3 ± 0.5	5.5 ± 0.4	720 ± 20
1	15.5 ± 0.7	6.5 ± 0.2	435 ± 36
2	20.9 ± 1.4	9.1 ± 0.3	353 ± 27
3	54.1 ± 2.7	12.8 ± 0.8	268 ± 21

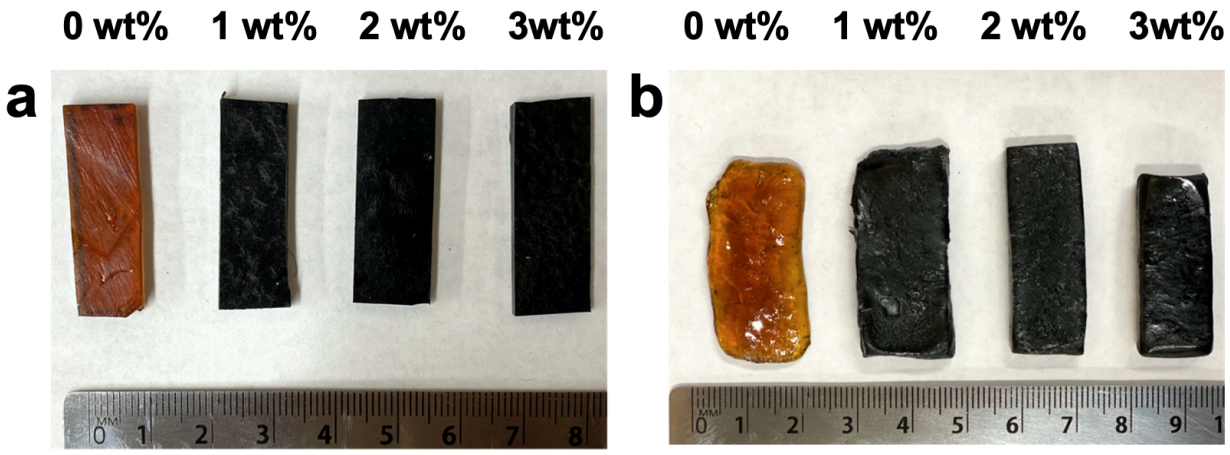

Fig. S1 Photographs of PU S-S with different MWCNTs-OH content before (a) and after (b) being immersed in toluene for 6 hours at room temperature.

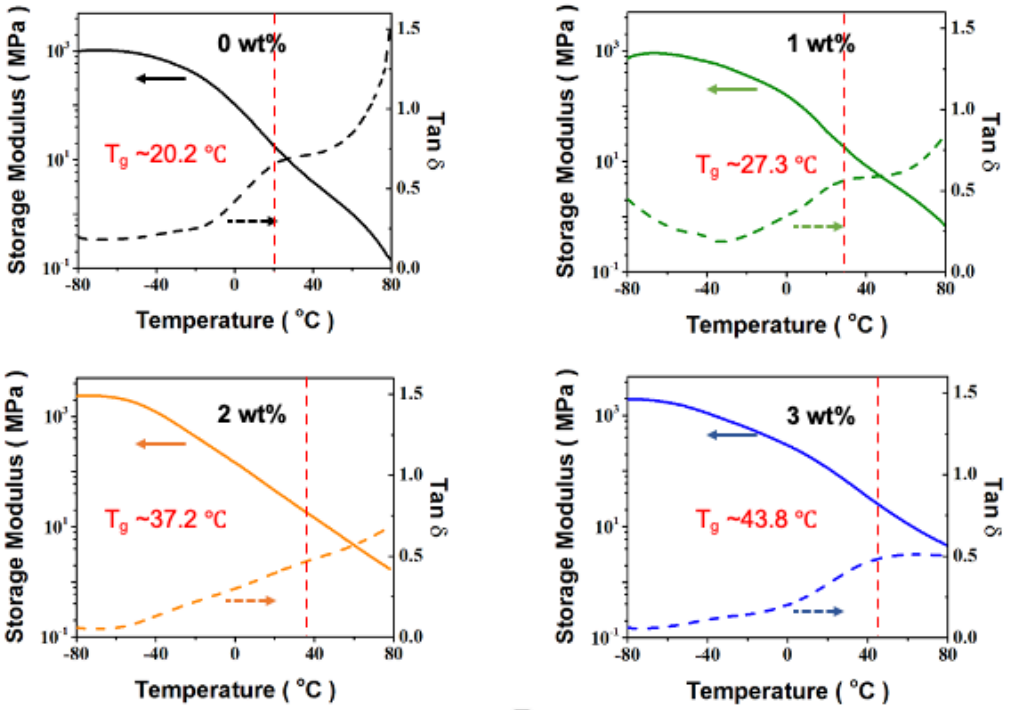

Fig. S2 Storage modulus (solid lines) and loss tangent data depending on temperature of PU S-S/MWCNTs-OH measured using a dynamic mechanical analysis machine. The tanδ pattern of PU S-S composites was an ambiguous peak due to the poorly packed hard segments.[1]

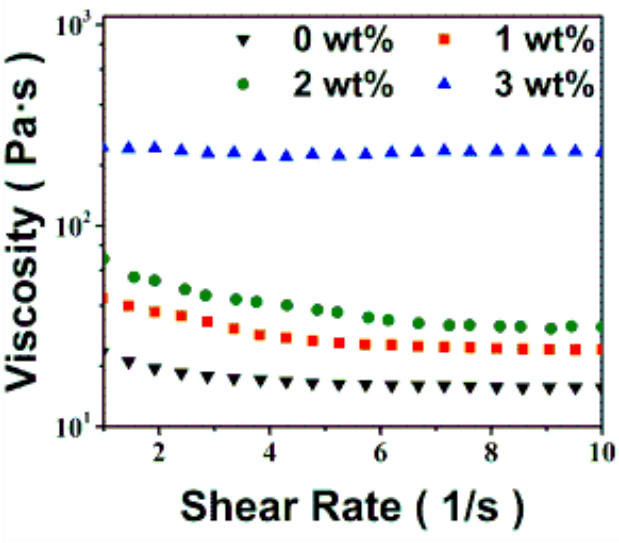

Fig. S3 Share rate-dependent viscosity curves of PU S-S/MWCNTs-OH samples at 145 °C measured using a rheometer from 1 to 10 s^{-1}.

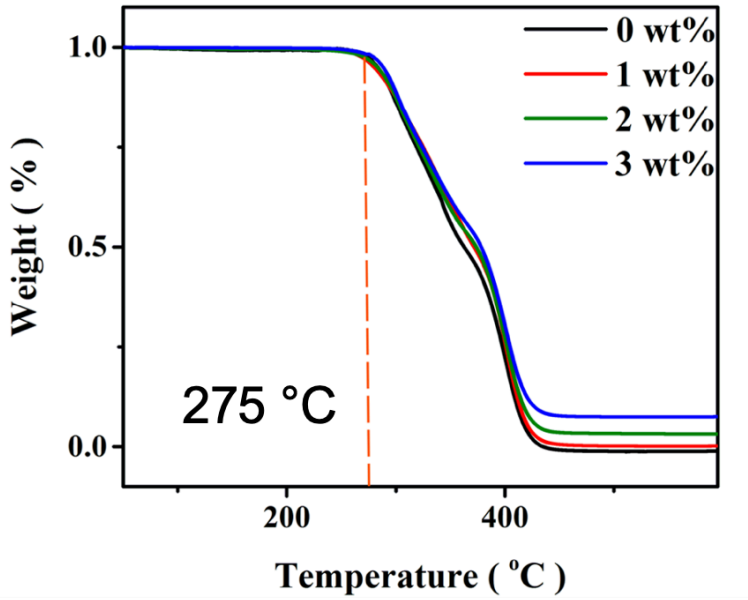

Figure S4. Thermogravimetric analysis of different PU S-S/MWCNTs-OH. Pyrolysis of composites began around 275 °C.

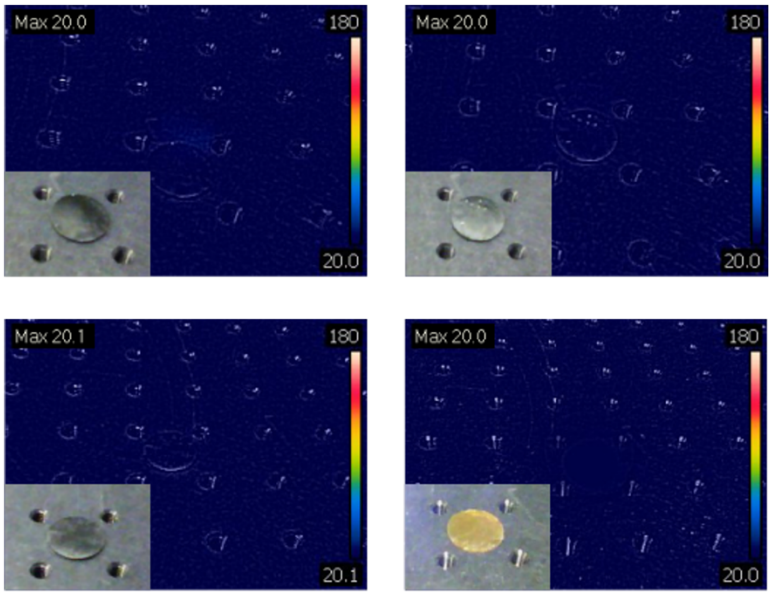

Figure S5. Thermographic images before NIR irradiation of PU S-S/MWCNTs-OH (sample diameter = 2 cm). The digital images of samples are shown as inset.

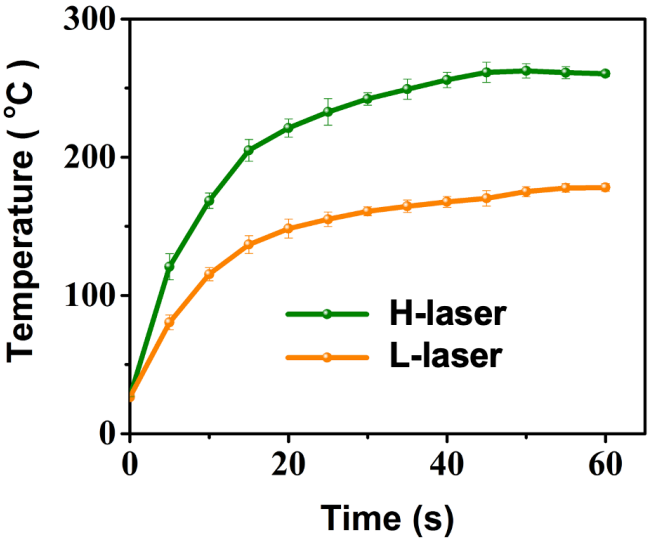

Figure S6. Temperature elevation of 2 wt% PU S-S under H-laser (1 W) and L-laser (0.5 W); spot diameter = 6 mm; working distance = 30 cm.

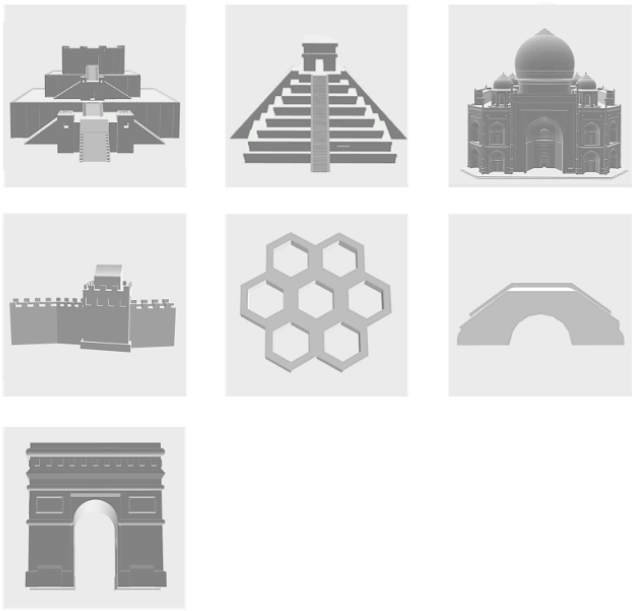

Figure S7. The CAD models of the 3D printed samples, in turn, are the Hanging Gardens of Babylon, Chichen Itza, Taj Mahal, Great Wall of China, honeycomb, bridge, Arc de Triomphe.

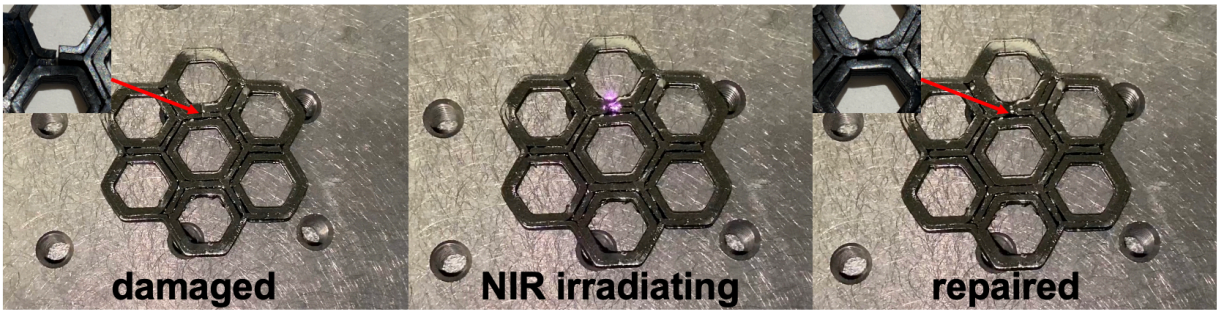

Figure S8. Photographs of a damaged and repaired 2 wt% PU S-S printing honeycomb sample. The detail images are shown as inset.

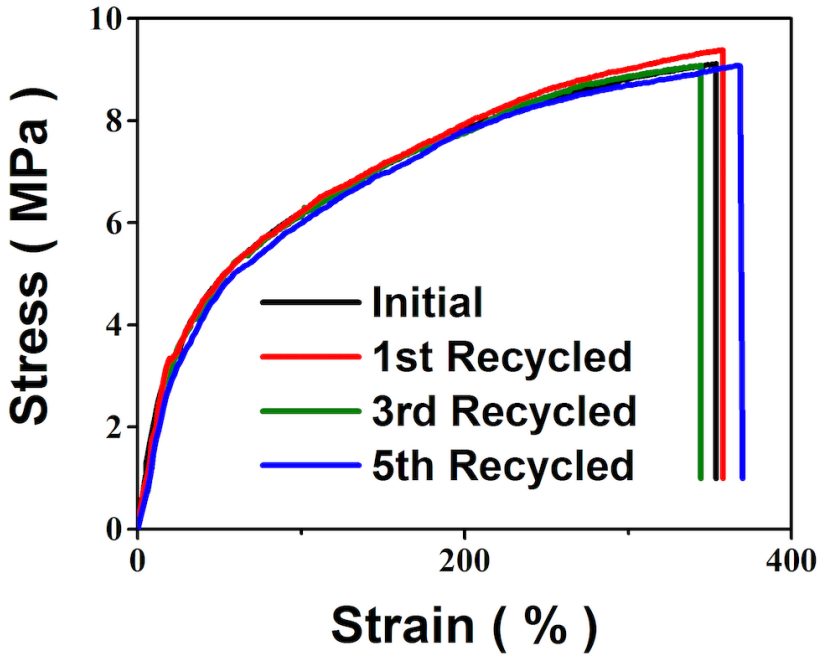

Figure S9. The tensile testing curves of initial material the1st, 3rd and 5th cycle recycled material.

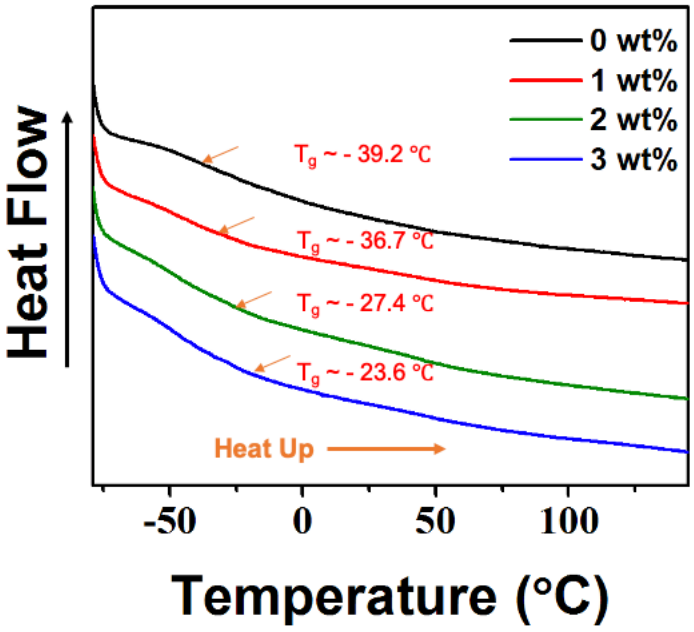

Figure S10. The DSC curves of PU S-S composites. The glass transit temperatures were labeled in the figure.

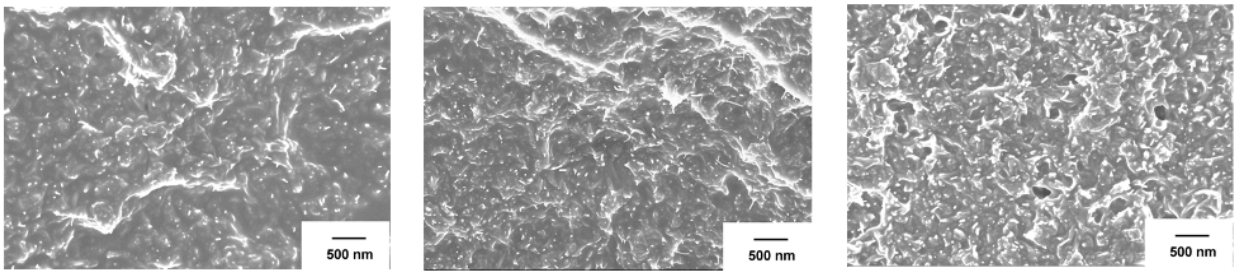

Figure S11. SEM images of PU S-S composites with different content of MWCNTs-OH. Scale bars: 500 nm.

Reference

1 S. M. Kim, H. Jeon, S. H. Shin, S. A. Park, J. Jegal, S. Y. Hwang, D. X. Oh and J. Park, Adv. Mater., 2018, 30, 1705145.