

Supporting Information for

Circular 3D Printing: Reprintable Polymers for Digital Light

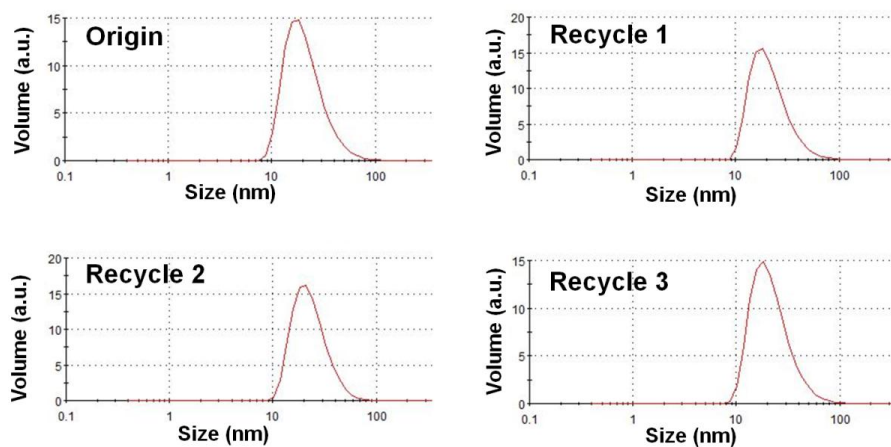
Processing Printing

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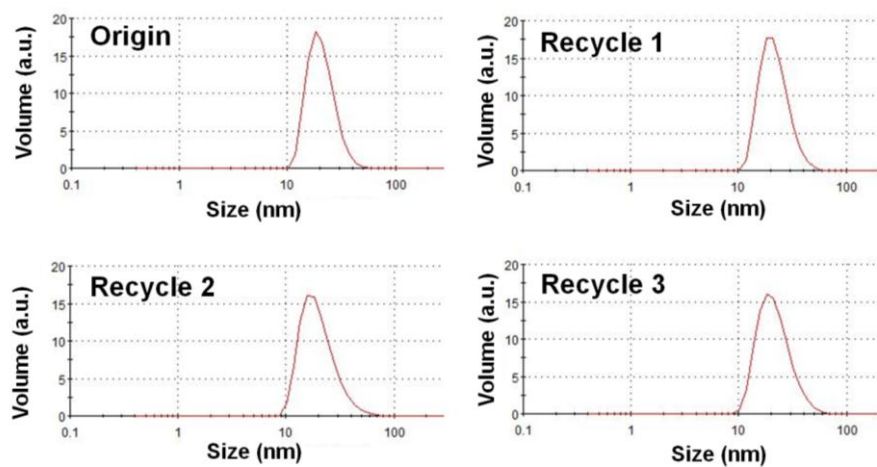
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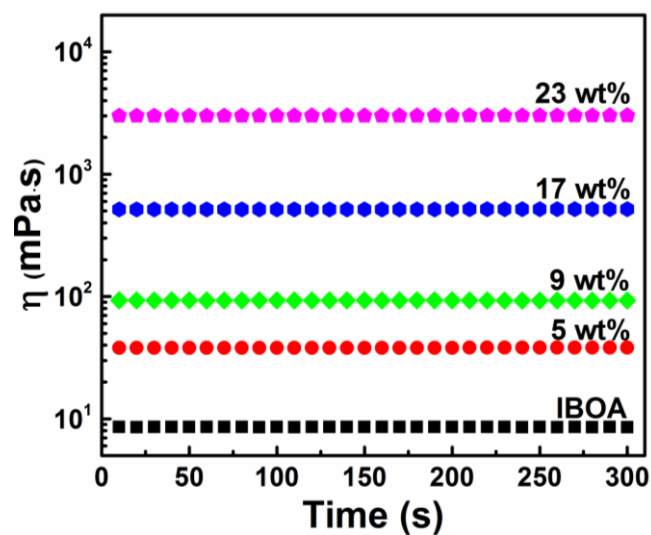
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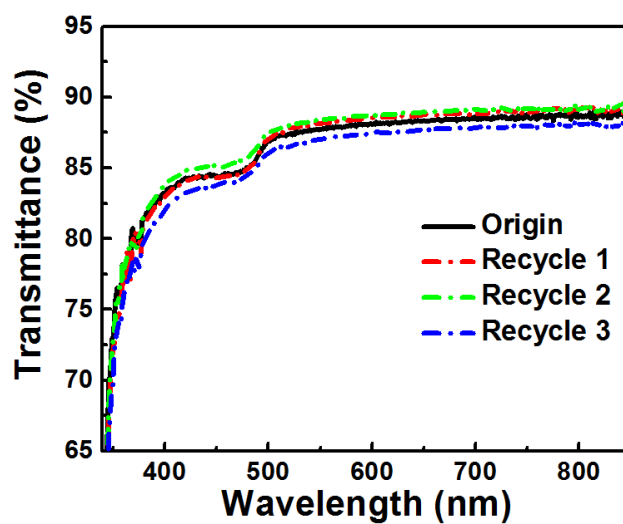
Supplementary Figure 1. DLS curves of solutions of poly(IBOA) in THF.



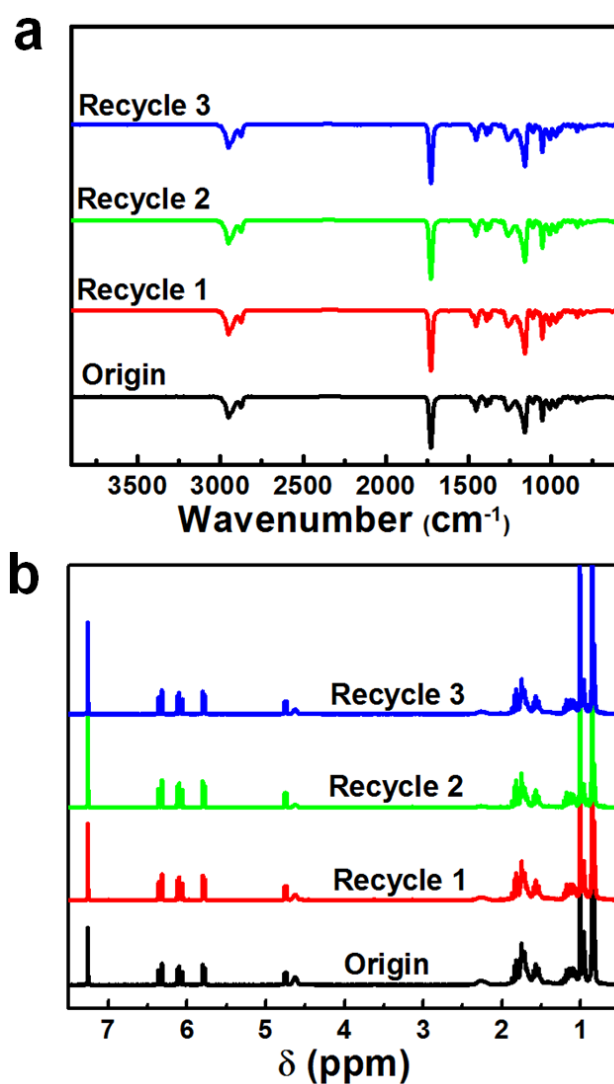
Supplementary Figure 2. DLS curves of solutions of poly(IBOA) in IBOA.



Supplementary Figure 3. Viscosity of IBOA monomer and solutions of poly(IBOA) in IBOA at different concentrations.



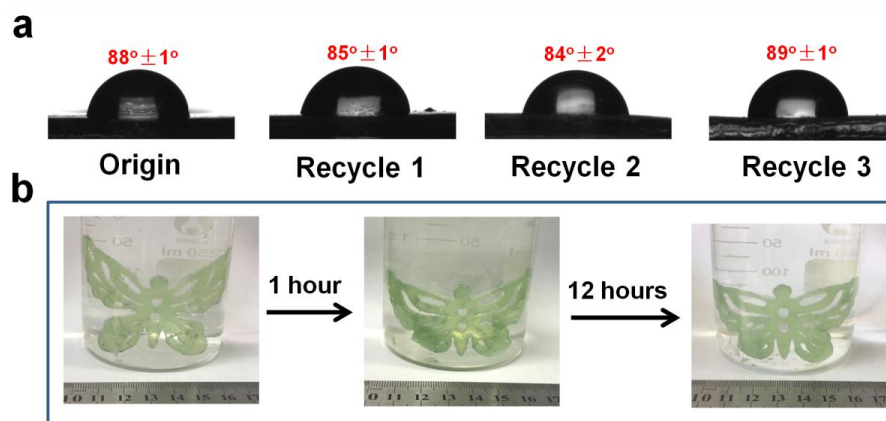
Supplementary Figure 4. UV-vis spectra of original and recycled poly(IBOA) films.



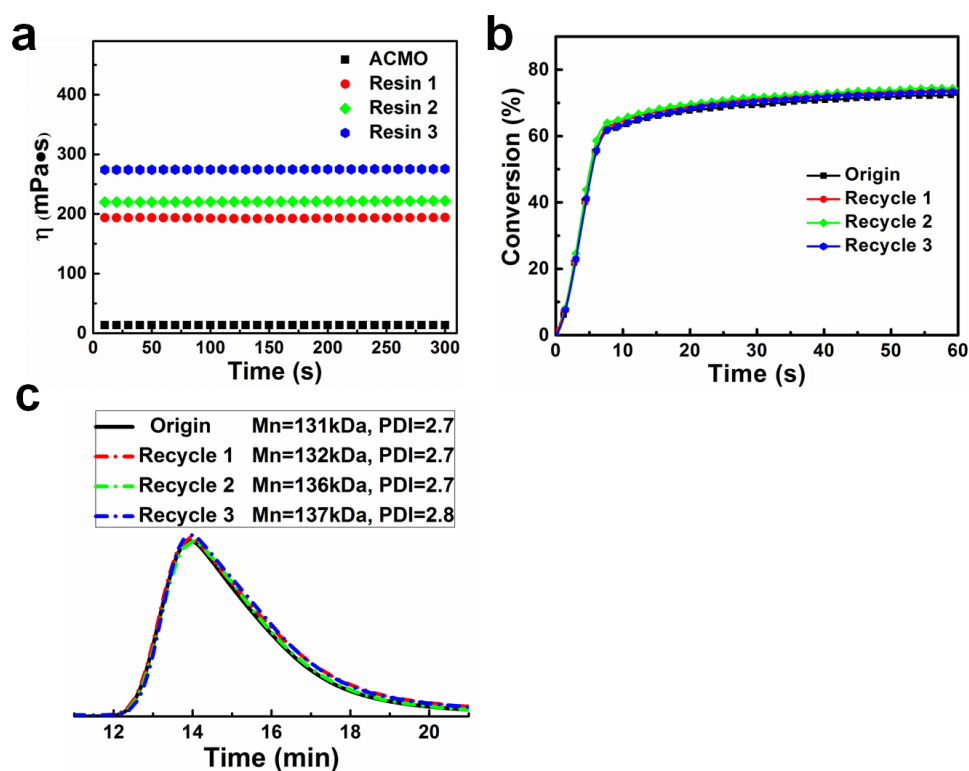
Supplementary Figure 5. (a) FTIR and (b) ¹H-NMR spectra of original and recycled poly(IBOA) films.



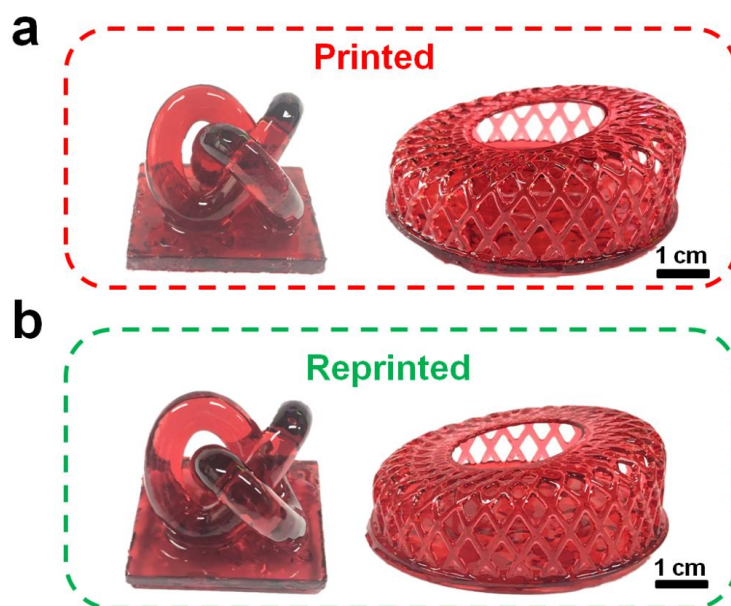
Supplementary Figure 6. Photos of a printed commercial thermoset object immersed in DMF.



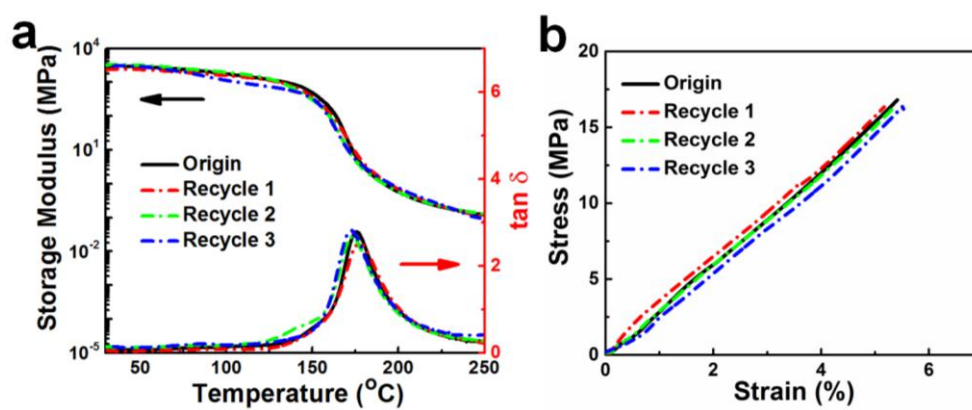
Supplementary Figure 7. (a) Water contact angle of original and recycled poly(IBOA) films. (b) 3D printed butterfly of linear poly(IBOA) immersed in 90°C water.



Supplementary Figure 8. (a) Viscosity and (b) reaction kinetics profiles of ACMO monomer and recycled solutions of poly(ACMO) in ACMO (5 wt%). (c) GPC curves of original and recycled poly(ACMO).



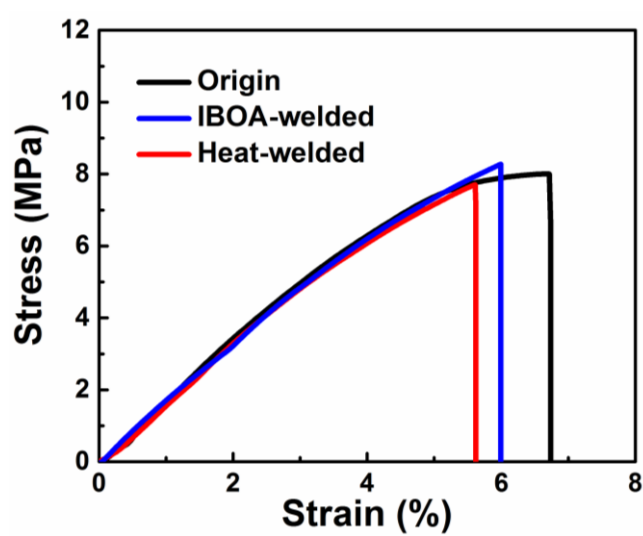
Supplementary Figure 9. (a) Printed objects from original ACMO resin. (b) Reprinted objects from recycled resin (5 wt% poly(ACMO) in ACMO).



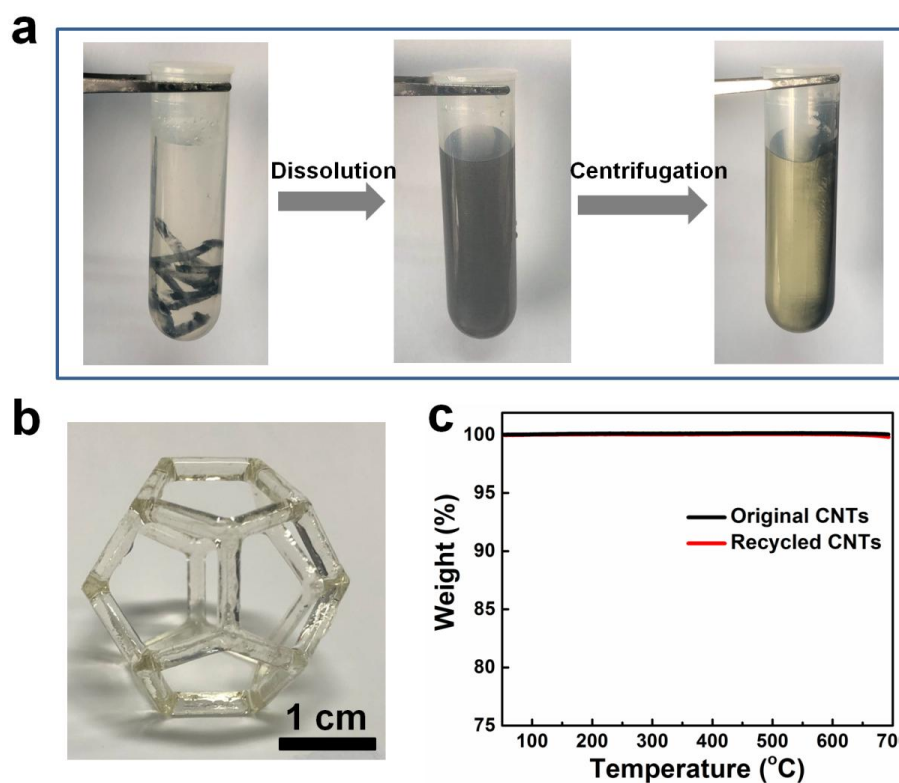
Supplementary Figure 10. (a) DMA and (b) stress-strain curves of samples printed from original and recycled resins, respectively.



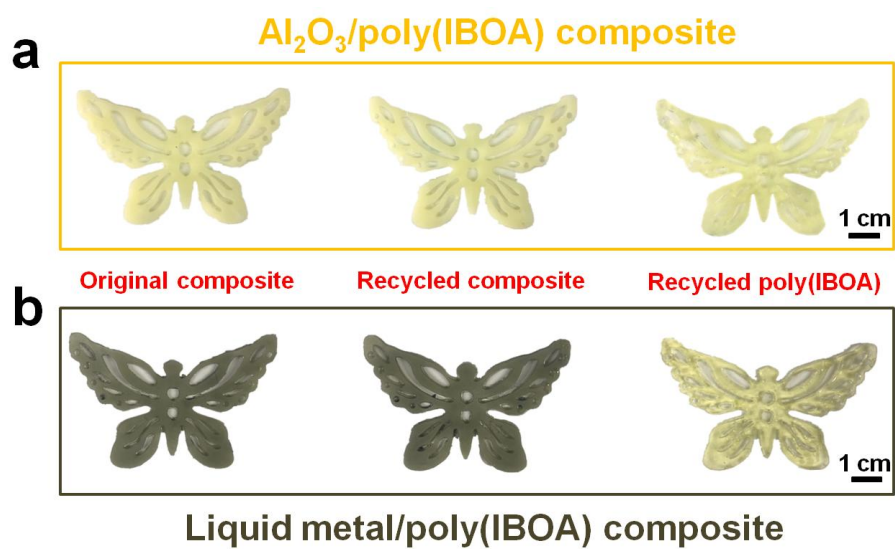
Supplementary Figure 11. DLP printed objects using the recycled resin of dissolving poly(IBOA) in ACMO monomer (3 wt%).



Supplementary Figure 12. Stress-strain curves of original and welded samples.



Supplementary Figure 13. (a) Recycling process of CNTs/poly(IBOA) composite. (b) Photo of DLP printed object from a recycled poly(IBOA) solution separated in (a). (c) TGA curves of original CNTs and recycled CNTs from CNTs/poly(IBOA) composite.



Supplementary Figure 14. Butterflies printed from original and recycled (a) Al_2O_3 and (b) liquid metal based poly(IBOA) composites, respectively.

Supplementary Table 1. Viscosity of commercial resins (25°C)

Resins	Viscosity (cps)
Dipentaerythritol pentaacrylate	8000
Di-trimethylolpropane tetraacrylate	900
Pentaerythritol triacrylate	590
1,6-hexanediol diacrylate	8
Tripropylene glycol diacrylate	12
Aliphatic urethane acrylate (UT20508)	560
Aliphatic urethane acrylate (UT20501)	2525
Aliphatic urethane acrylate (UT20301)	1425
Self-initiative acrylate oligomer (Unicryl R-9119)	90
Modified polyester acrylate (UT30153)	200
Modified polyester acrylate (FSP59369)	3580

Supplementary Table 2. Thermal and mechanical properties of original and recycled poly(IBOA)

Samples	T _g (°C)	T _d (°C)	Young's modulus (MPa)	Tensile strength (MPa)	Strain at break (%)
Origin	68	223	143.1 ±6.8	8.0 ±0.7	6.7 ±0.9
Recycle 1	71	235	130.9 ±5.3	8.5 ±1.0	6.9 ±0.7
Recycle 2	69	247	134.3 ±4.7	8.4 ±0.8	6.5 ±0.8
Recycle 3	70	244	136.3 ±8.6	8.2 ±0.7	6.1 ±0.5