Electronic Supplementary Material (ESI) for Green Chemistry.

A Chemical Approach for the Future of PLA Upcycling: From Plastic Wastes to New 3D Printing Materials

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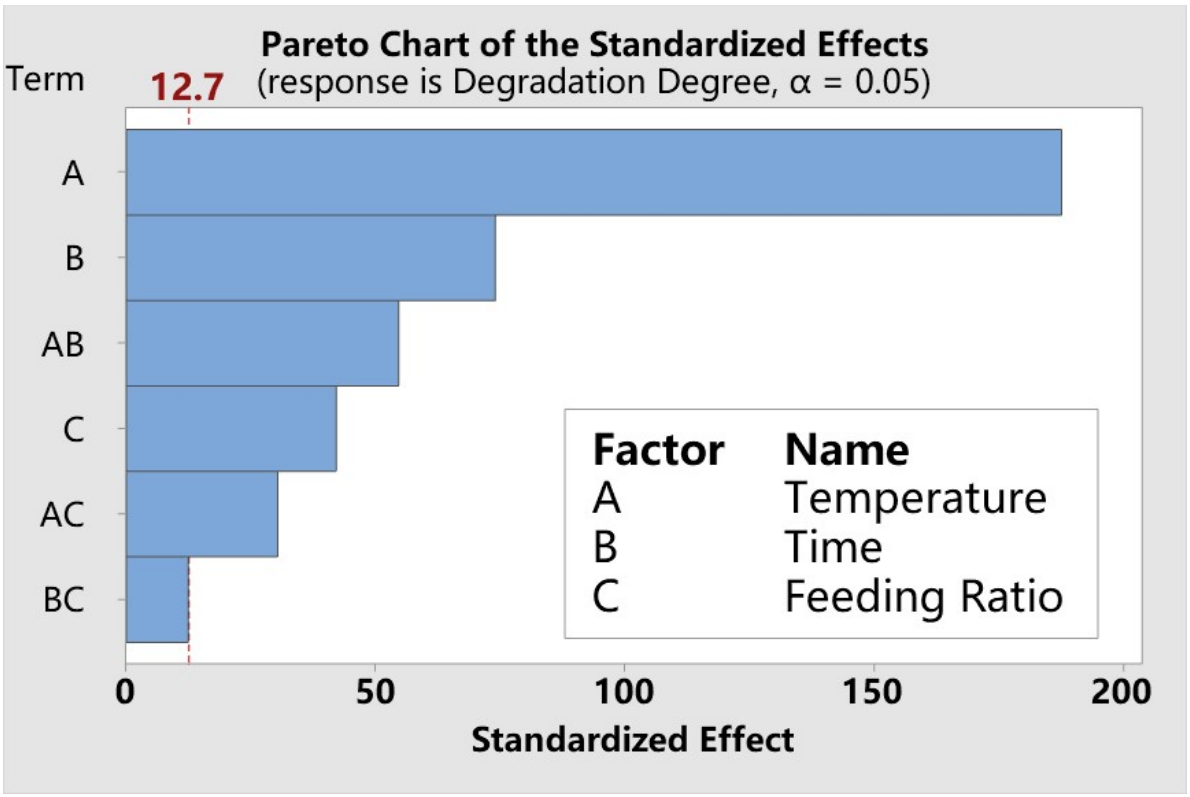

Fig. S1 Full factorial analysis of degradation degree.

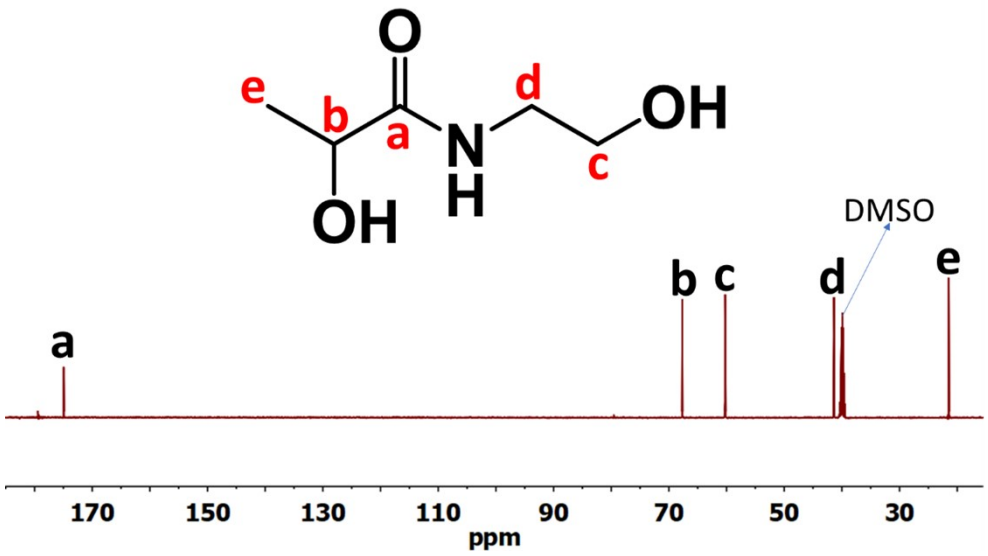

Fig. S2 ^{13}C-NMR spectrum of N-LEA.

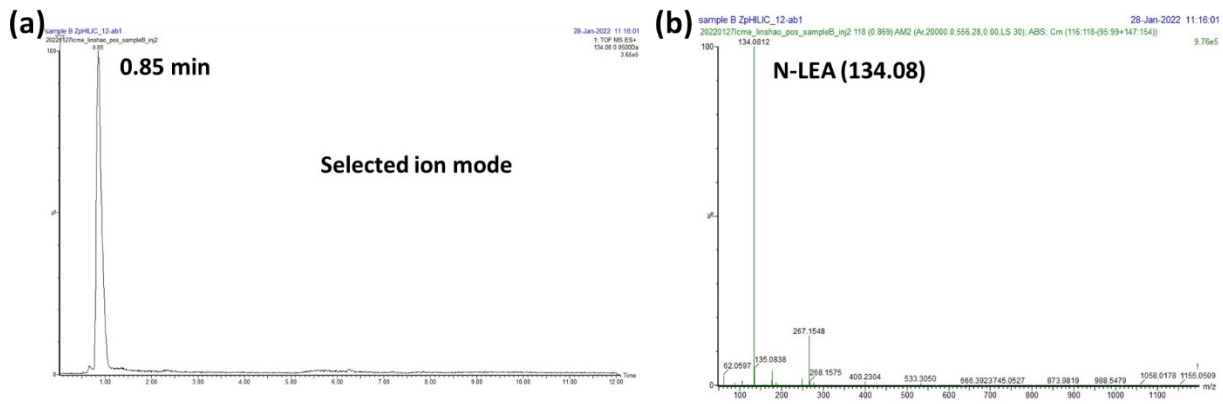

Fig. S3 LC-Mass spectra of N-LEA: (a) LC trace; (b) Mass spectrometry.

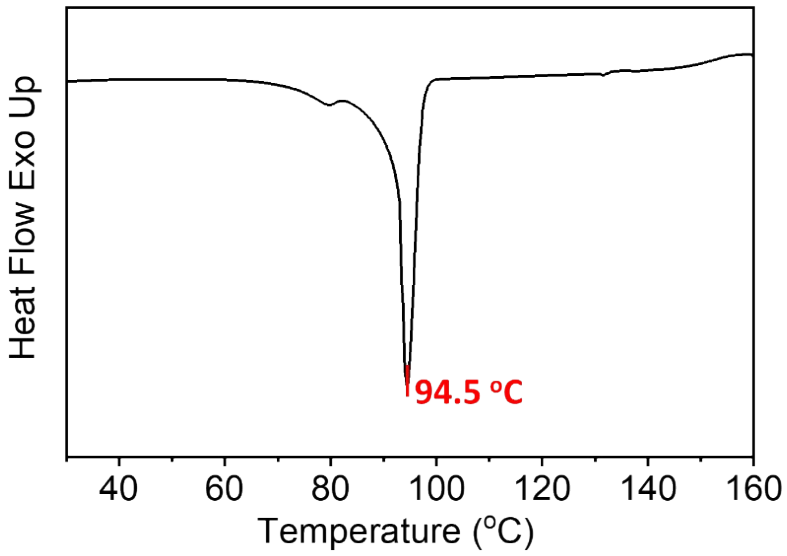

Fig. S4 DSC curve of DME.

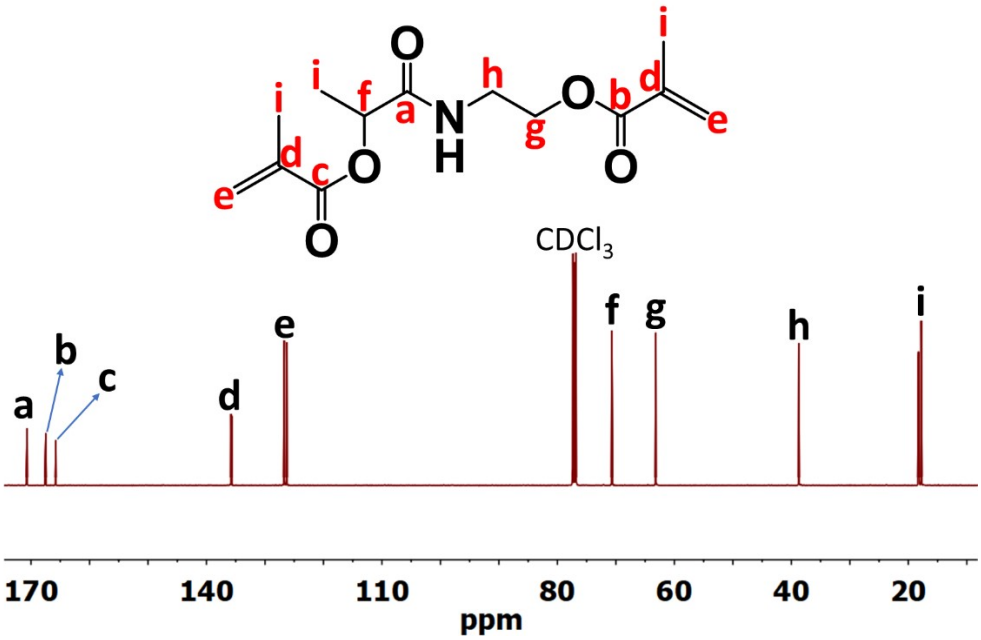

Fig. S5 ^{13}C-NMR spectrum of DME.

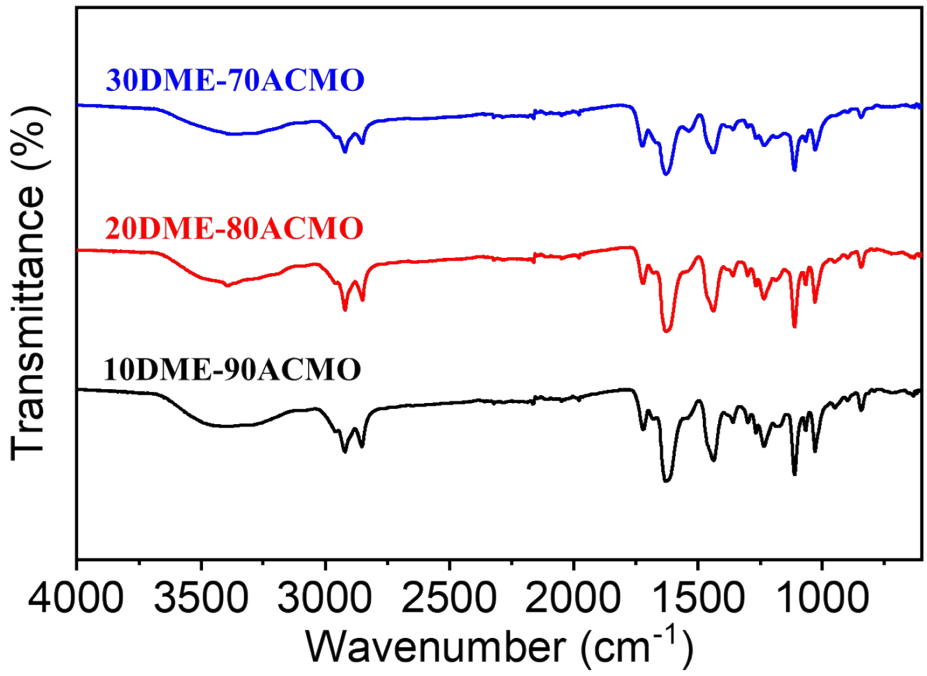

Fig. S6 Full range of FTIR spectra of 3D printed DME-ACMO resins.

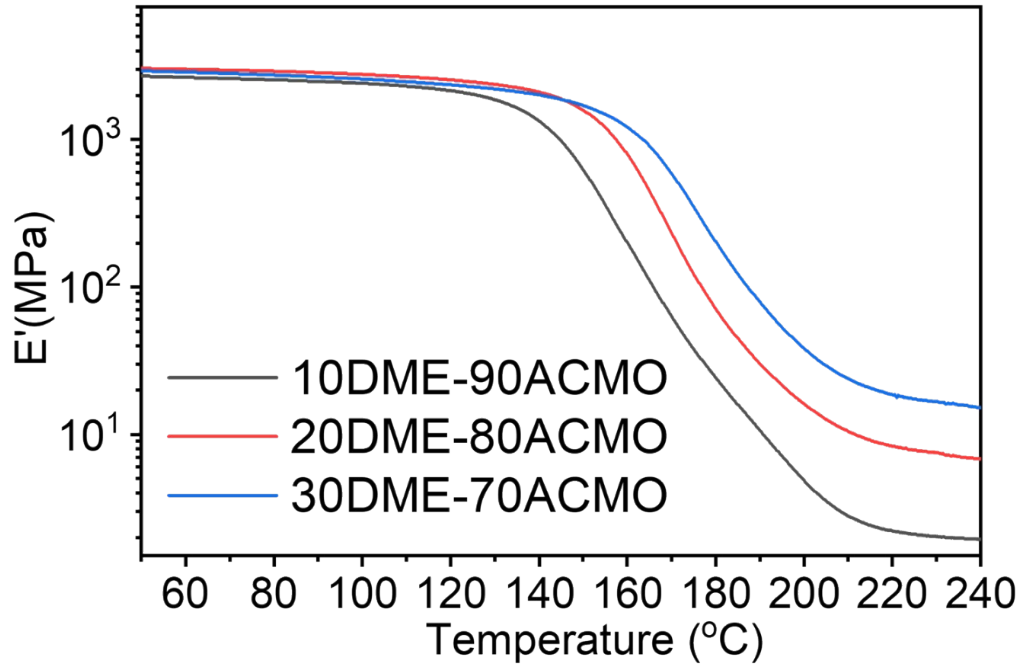

Fig. S7 Storage modulus (E') of 3D printed DME-ACMO resins from DMA measurement.

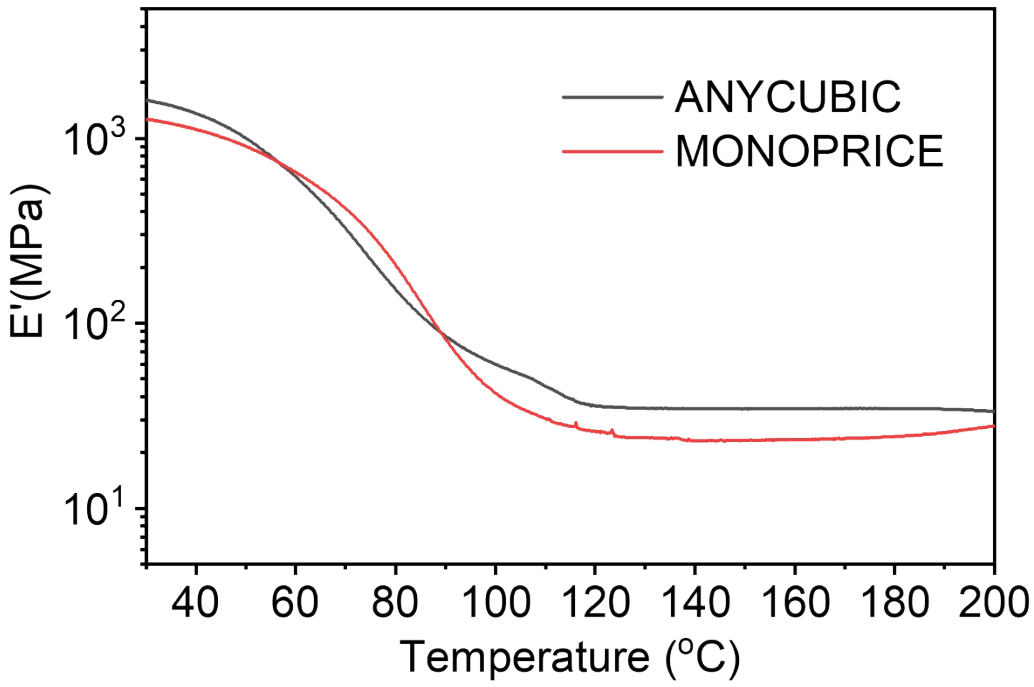

Fig. S8 Storage modulus (E') of 3D printed commercial resins from DMA measurement.

Table S1 Physical, thermal, and mechanical properties of 3D printed DME-ACMO photo-curable resins and commercial photo-curable resins

	T_g (°C)		T_{d5}[a] (°C)	Density (g/cm^3)	Gel content (%)	Swelling ratio	Tensile properties			IS[e] (KJ/m^2)
	DSC	DMA					σ[b] (MPa)	ε[c] (%)	E[d] (MPa)	
10DME-90ACMO	151.2	166.5	332	1.25	97.66	1.05	35.96±2.93	1.70	2521±68	4.38±0.48
20DME-80ACMO	166.3	173.9	327	1.29	97.37	1.04	50.58±0.52	2.29	2630±99	7.18±0.38
30DME-70ACMO	173.0	180.7	326	1.24	98.38	1.03	58.58±0.87	2.41	2818±113	5.13±0.33
ANYCUBIC	73.8	79.2	335	1.20	98.03	1.16	21.59±1.30	1.67	1533±58	4.61±0.04
MONOPRICE	83.2	88.9	331	1.18	99.63	1.17	47.54±1.02	5.21	1461±18	4.21±0.08

[a]The temperature at 5 wt% loss from TGA results (Fig. 3f). [b]Tensile strength. [c]Elongation at break. [d]Young's modulus. [e]Impact strength.

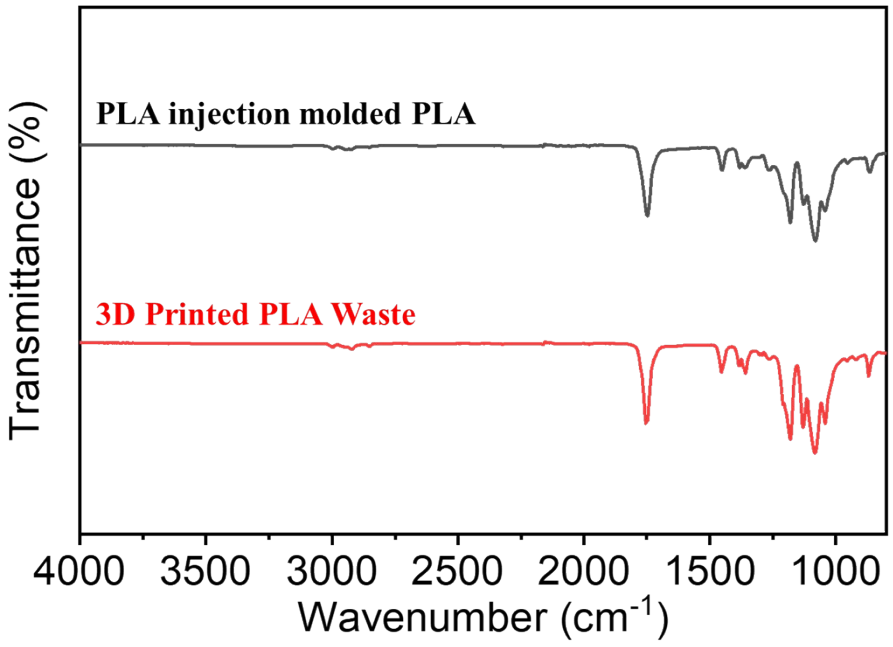

Fig. S9 FT-IR spectra of injection molded PLA and PLA 3D printed waste.

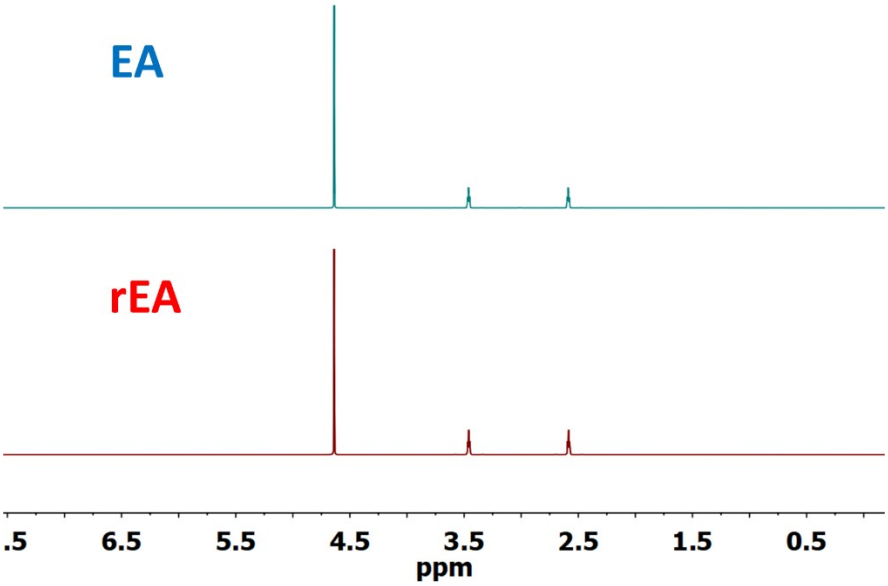

Fig. S10 ^{1}H-NMR spectra of EA and rEA.

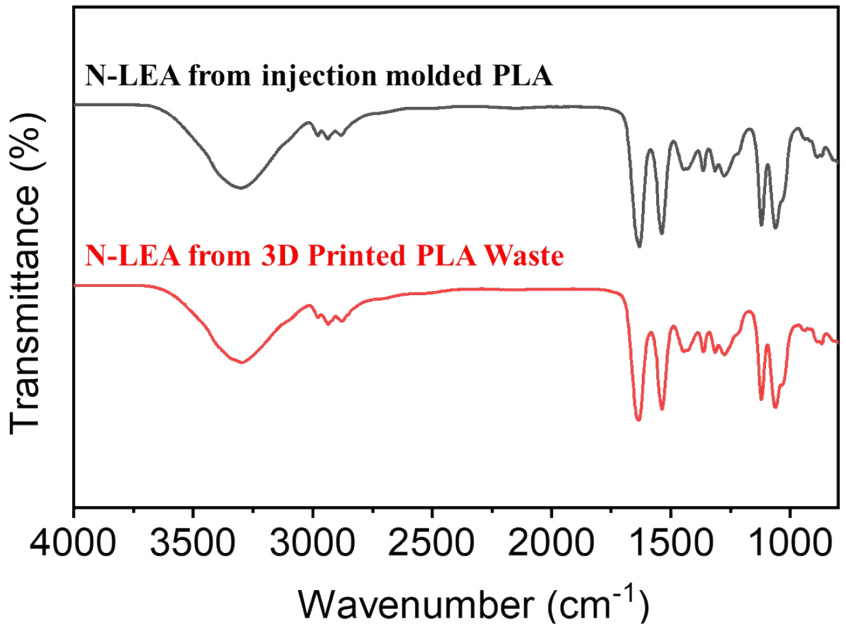

Fig. S11 FT-IR spectra of N-LEA from injection molded PLA and 3D printed PLA waste.

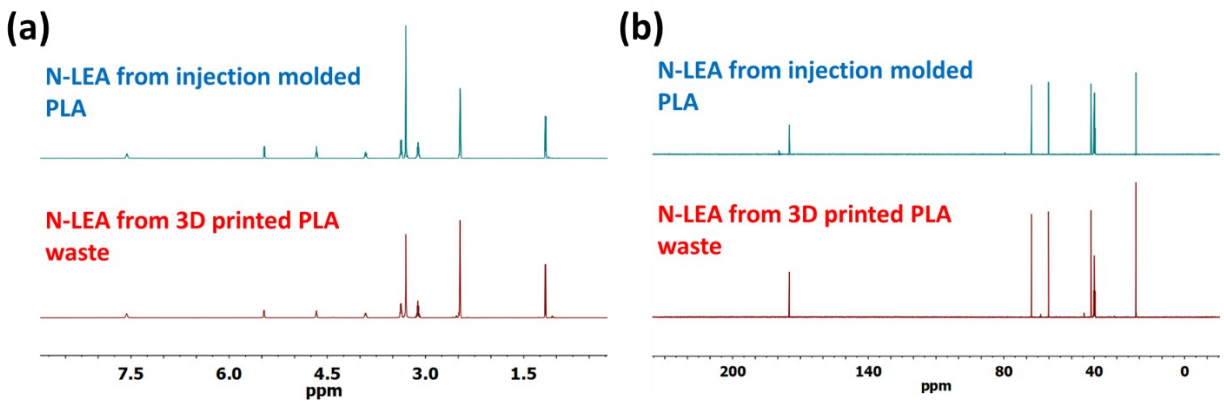

Fig. S12 (a) ^{1}H-NMR spectra, and (b) ^{13}C-NMR spectra of N-LEA from injection molded PLA and 3D printed PLA waste.

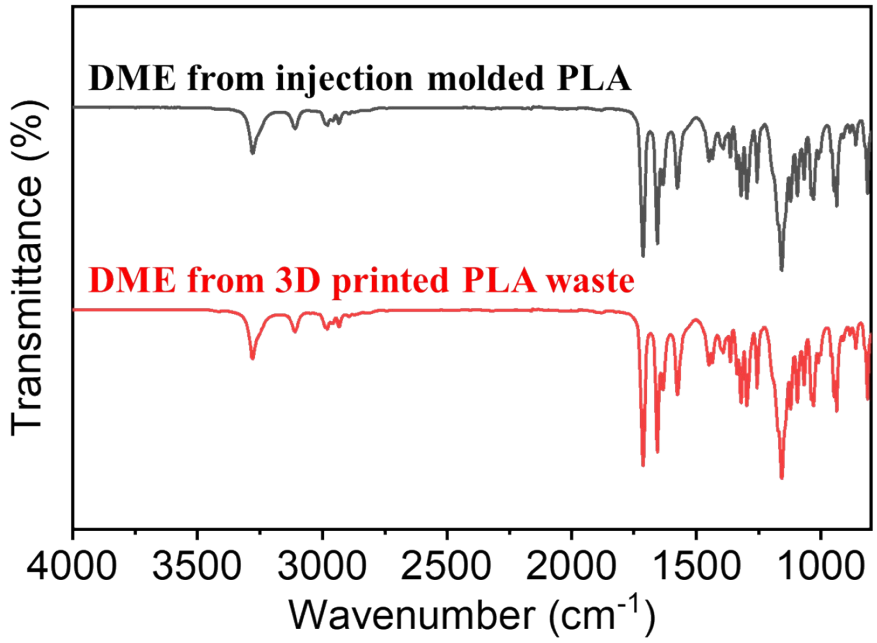

Fig. S13 FT-IR spectra of DME from injection molded PLA and 3D printed PLA waste.

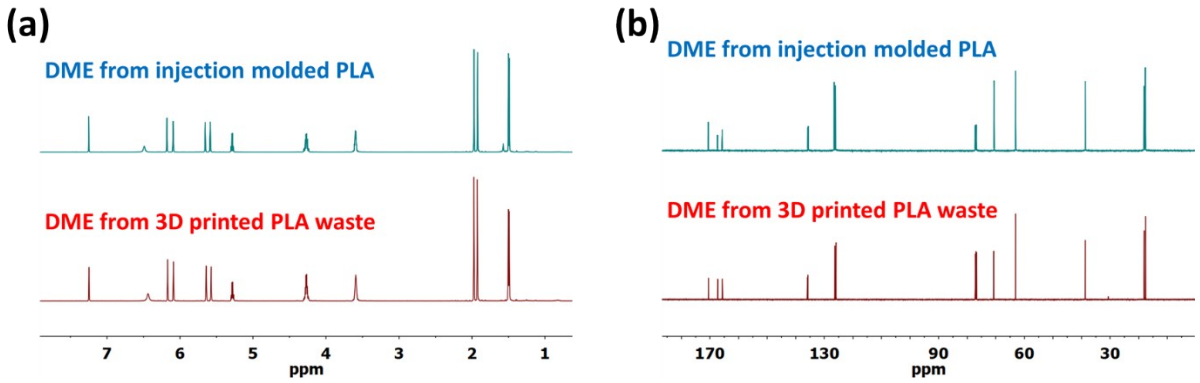

Fig. S14 (a) ^{1}H-NMR spectra, and (b) ^{13}C-NMR spectra of DME from injection molded PLA and 3D printed PLA waste.

Table S2. Solvent resistance (Swelling ratio, *SR*) of DME-ACMO 3D printed resins.

	Distilled water	Ethyl acetate	5% acetic acid	10% sodium hydroxide solution	Methyl Alcohol
10DME-90ACMO	110.2%	2.5%	101.5%	266.4%	23.6%
20DME-80ACMO	53.5%	0%	54.3%	477.4%	22.4%
30DME-70ACMO	33.7%	0.2%	36.6%	298.3%	19.7%

Table S3. Solvent resistance (weight remaining, w_r) of DME-ACMO 3D printed resins.

	Distilled water	Ethyl acetate	5% acetic acid	10% sodium hydroxide solution	Methyl Alcohol
10DME-90ACMO	98.76%	98.58%	98.15%	116.54%	97.77%
20DME-80ACMO	95.02%	96.52%	97.94%	140.01%	98.51%
30DME-70ACMO	95.29%	98.19%	98.12%	112.84%	99.55%