

SUPPORTING INFORMATION

Effect of chloride salts and microwave on polyethylene terephthalate (PET) hydrolysis by iron chloride/acetic acid Lewis/Brønsted acidic deep eutectic solvent

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Table S1. Experimental melting points of **LBDES1** (average of four measurements).

x($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$)	x(acetic acid)	T_m (K)
1	0	310.15 ^a
0.75	0.25	219.9 \pm 2.75
0.67	0.33	215.4 \pm 0.75
0.5	0.5	209.35 \pm 2.8
0.33	0.67	211.75 \pm 1.2
0	1	289.6 ^b

^a From PubChem, ref 1; ^b From National Institute of Standards and Technology, ref 2

Table S2. Density values of **LBDES1** at different temperatures, in the absence and presence of CaCl_2 (**LBDES2**).

T (°C)	Density (g/mL)	
	LBDES1	LBDES2
15	1.5188	1.5291
20	1.5092	1.5189
25	1.4997	1.5089
30	1.4903	1.4990
35	1.4810	1.4893
40	1.4718	1.4799
45	1.4627	1.4706
50	1.4538	1.4615
55	1.4449	1.4527
60	1.4363	1.4440

Table S3. Conductivity values of **LBDES1** at different temperatures, in the absence and presence of CaCl_2 (**LBDES2**).

T (°C)	σ (mS/cm)	
	LBDES1	LBDES2
15	5.58	11.69
20	7.38	14.8
25	9.68	18.51
30	13.47	22.3
35	16.57	26.9
40	20.2	31.3
45	24.1	36.5
50	28.6	41.6
55	33.2	46.8
60	37.8	48.6

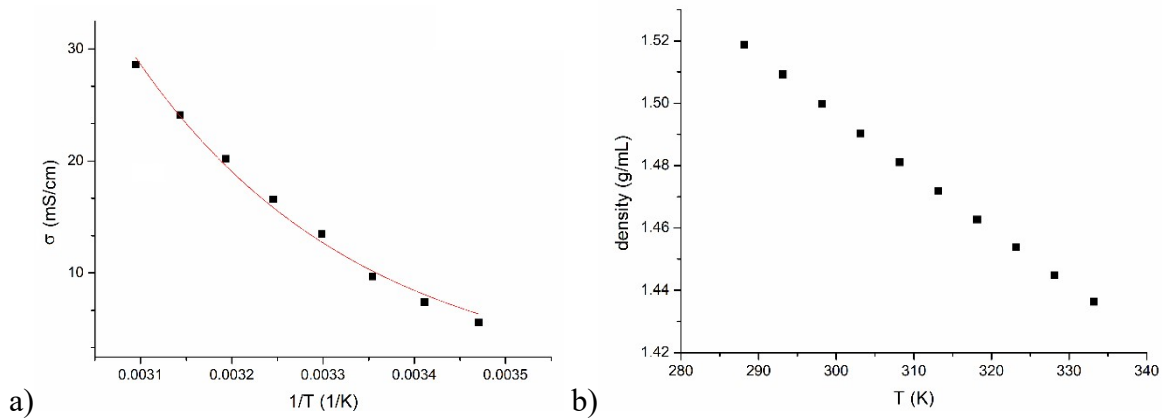


Figure S1. Graphical trends of (a) conductivity and (b) density of **LBDES1** with temperature. For conductivity data, the exponential fitting equation is $\sigma = (9 \pm 4)10^6 \exp((4100 \pm 200)/T)$ ($r^2 = 0.9921$).

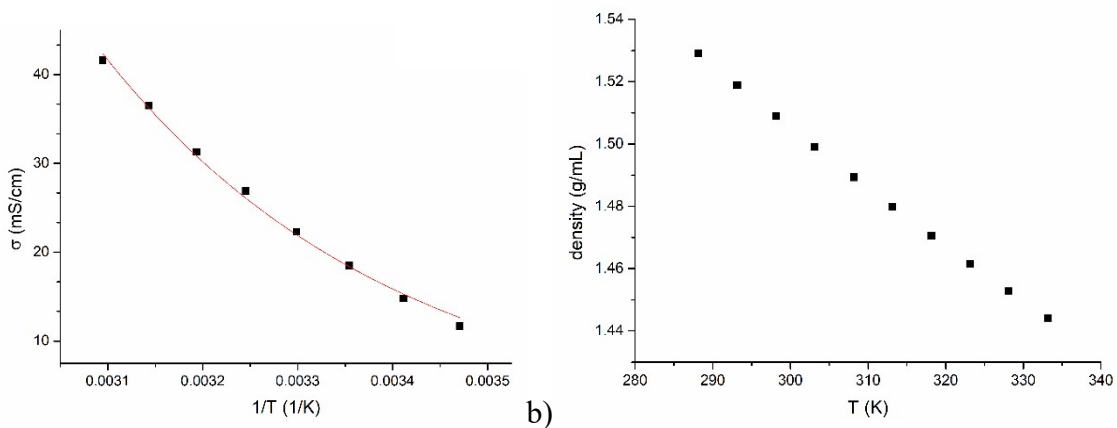


Figure S2. Graphical trends of (a) conductivity and (b) density of **LBDES2** with temperature. For conductivity data, the exponential fitting equation is $\sigma = (9 \pm 2)10^5 \exp((3220 \pm 80)/T)$ ($r^2 = 0.9958$).

Table S4. Melting point (T_m , °C) of **LBDES1** with the addition of different aliquots of CaCl_2 .

CaCl_2 (eq)	T_m
0	-60.0
1	-59.0
2	-59.3
3	-59.3
4	-63.7

IR and NMR spectra

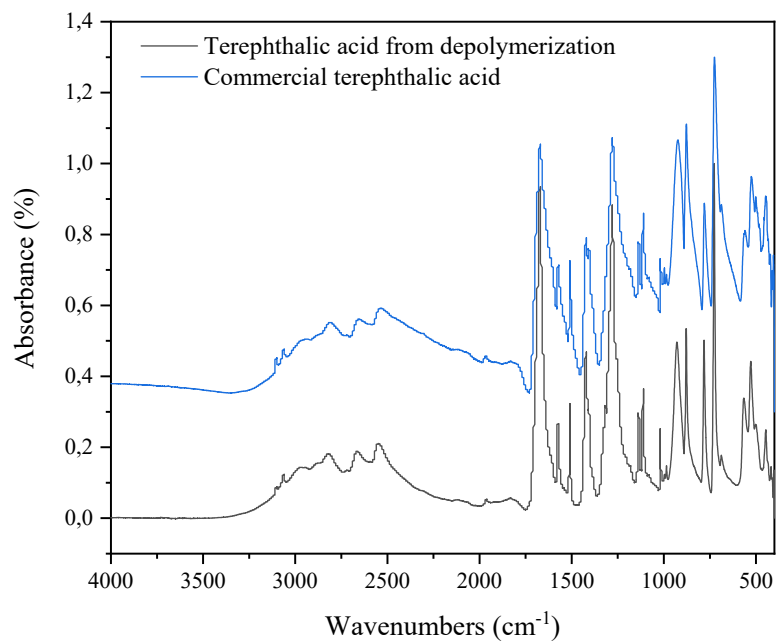


Figure S3. Scan range 400-4000 cm^{-1} , 32 scans, resolution 4 cm^{-1} .

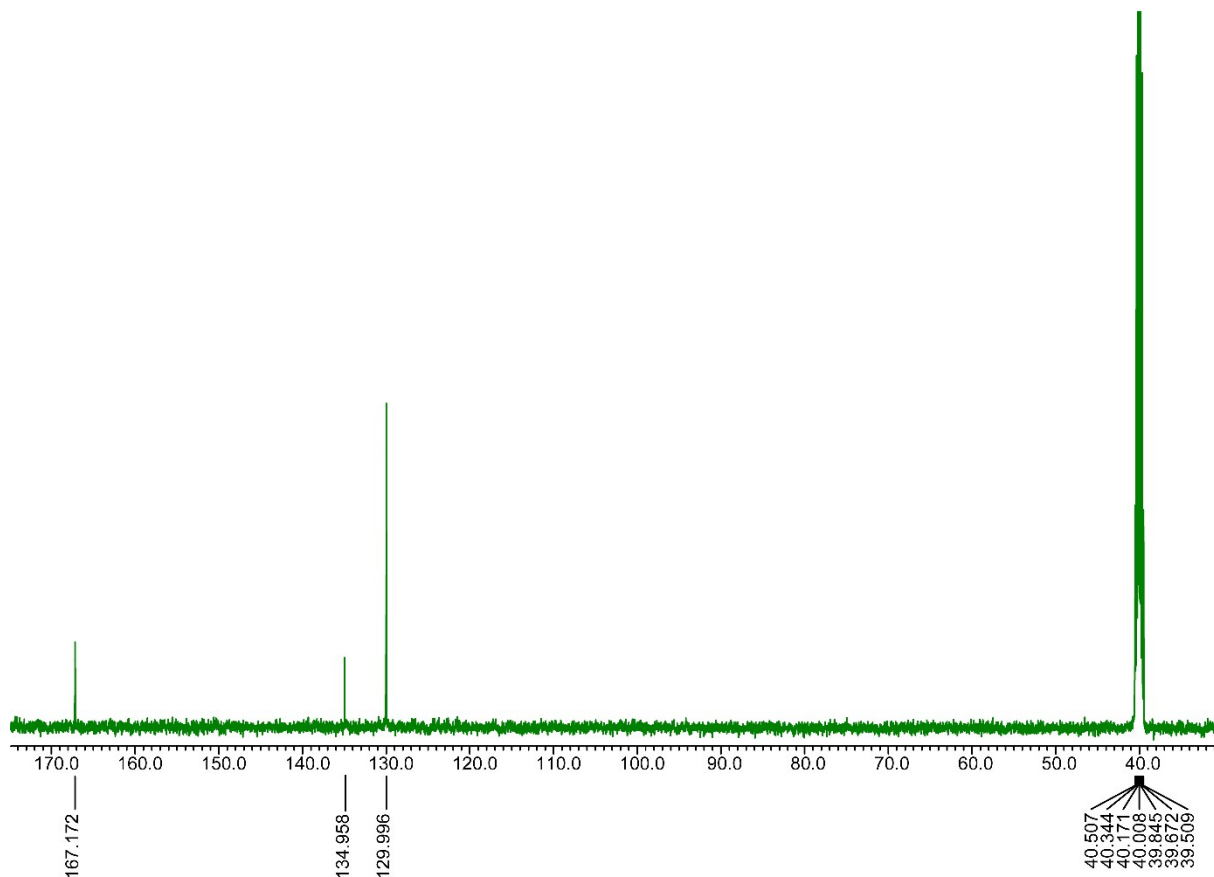


Figure S4. $^{13}\text{C}\{^1\text{H}\}$ NMR spectrum (solvent DMSO- d_6 , room temperature) of TA resulting from the depolymerization of PET by using $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ /acetic acid (1:1) and improved work-up (see main text).

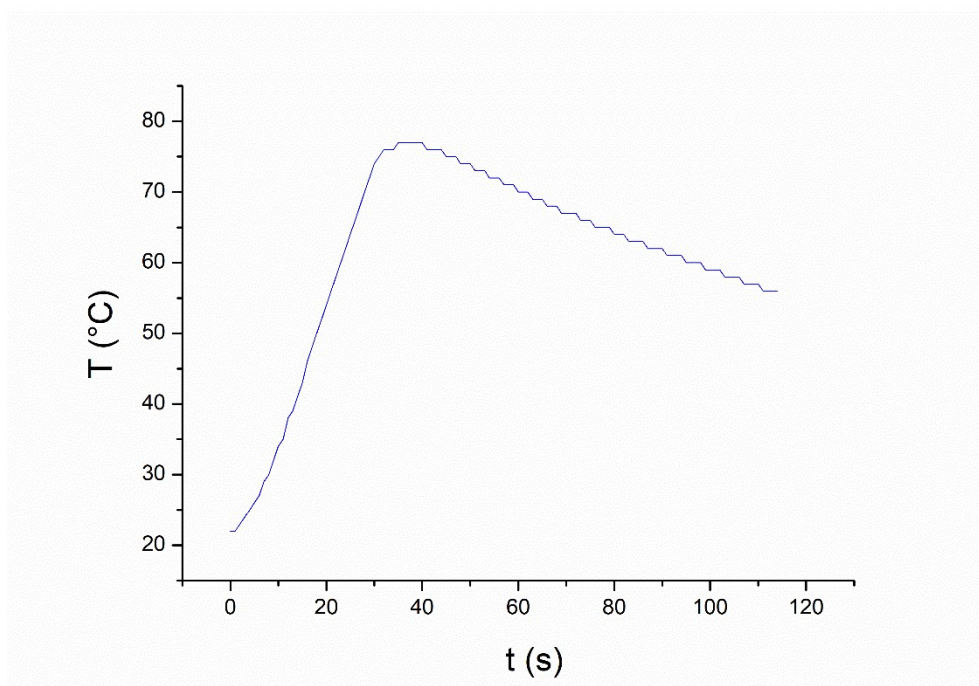


Figure S5. Temperature change of 8 g of deionized water under a microwave irradiation of 100 W for 30 s.

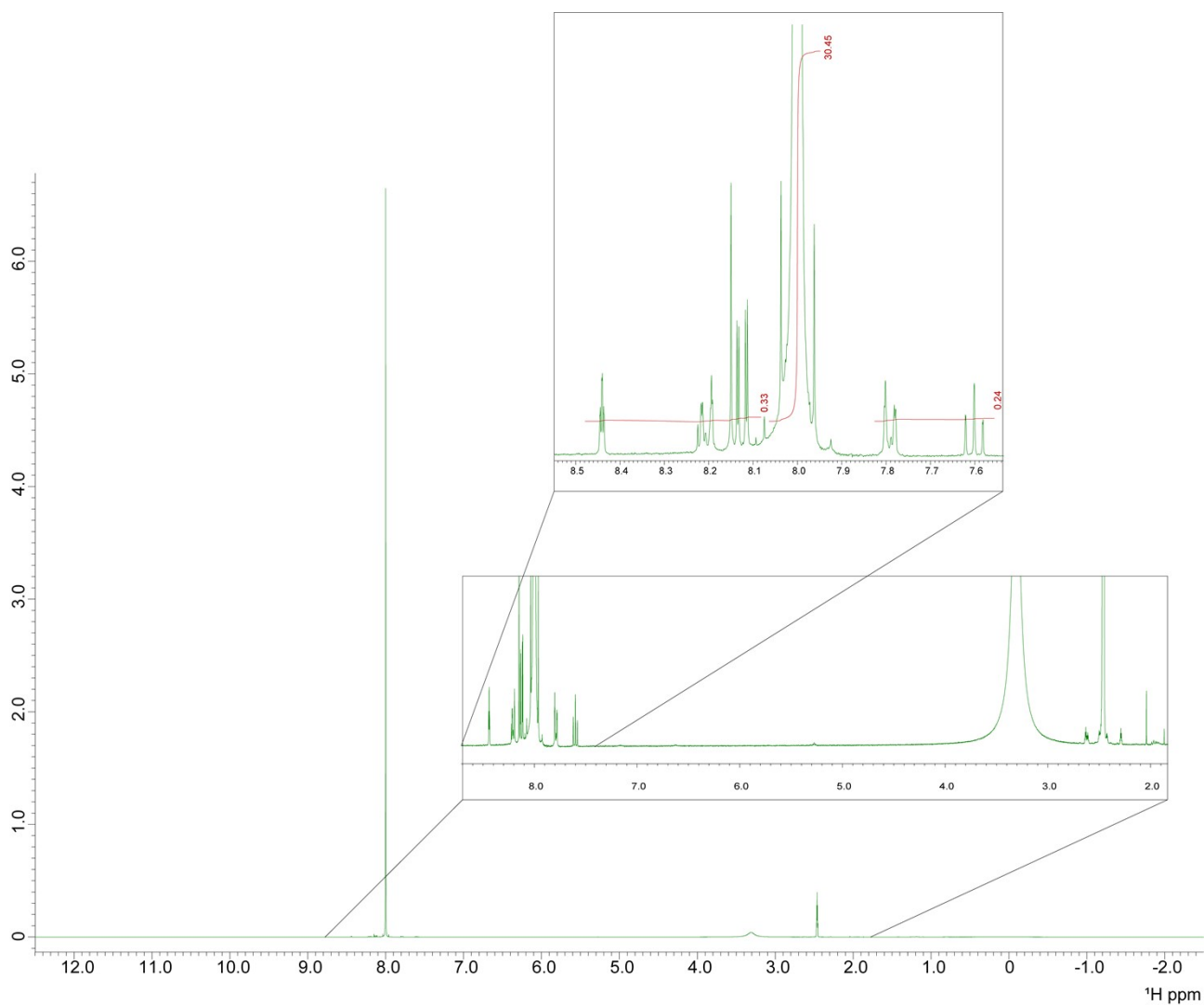


Figure S6. ^1H NMR spectrum (solvent DMSO- d_6 , room temperature) of TA resulting from the depolymerization of PET at 180 °C under MW irradiation. The large peak at 8 ppm is due to TA, the small peaks around it are due to impurities present in post-consume bottles (as isophthalic acid and benzoic acid). Any peaks due to bis(2-hydroxyethyl) terephthalate would be present in the 3.8-4.3 ppm (two triplets) but the zone is clean.

References

- (1) <https://pubchem.ncbi.nlm.nih.gov/compound/Ferric-chloride>.
- (2) <https://webbook.nist.gov/cgi/cbook.cgi?ID=C64197&Mask=4>.