Supplementary Materials for

Switchable oil-water phase separation of ionic liquids based microemulsions by CO_2

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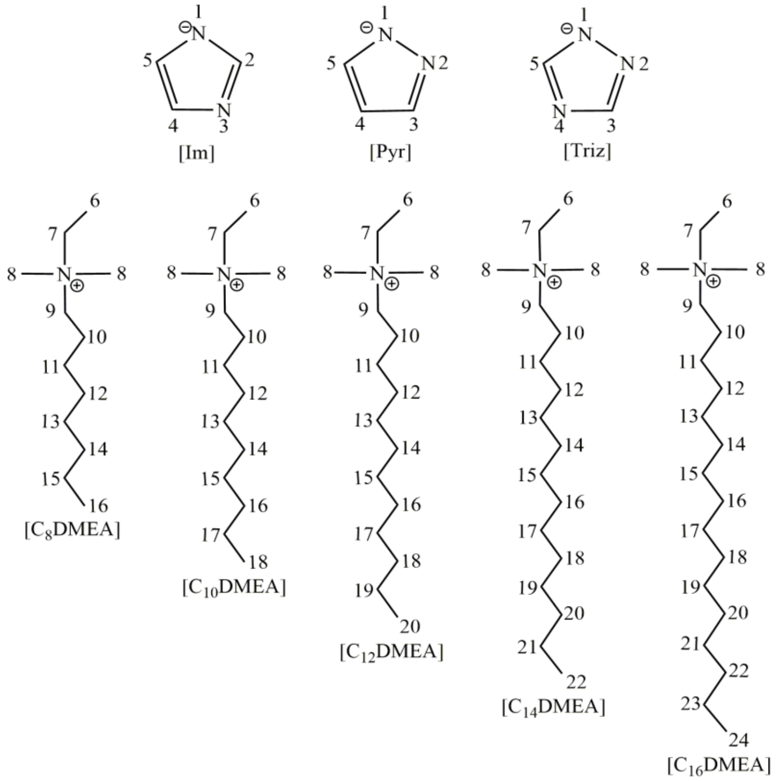
Experimental Section

1. NMR and IR data of the ILs



Numbering of the position of carbon atoms in the anions and cations of the ILs

[C_8DMEA][Im]: ^{1}H NMR (D_2O, TMS): δ 0.75 (t, 3H, CH_3), 1.24 (m, 13H, CH_2 and CH_3), 1.62 (m, 2H, CH_2), 2.89 (s, 6H, CH_3), 3.11 (t, 2H, CH_2), 3.24 (m, 2H, CH_2), 7.02 (s, 2H, Im C4 and C5), 7.64 (s, 1H, Im C2) ppm; ^{13}C NMR (D_2O, TMS): δ 7.35 (C6), 13.47 (C16), 21.69 (C15), 22.01 (C10), 25.48 (C11), 28.18 (C12), 28.22 (C13), 31.02 (C14), 49.75 (C8), 49.80 (C8), 59.32 (C7), 63.36 (C9), 122.50 (C4), 122.55 (C5),137.69 (C2) ppm; IR: ν 3070, 2955, 2925, 2856, 1707, 1634, 1446, 1378, 1289, 1215, 1150, 1076, 1022, 979, 920, 820, 757, 724 cm^{-1}.

[C_{10}DMEA][Im]: ^{1}H NMR (D_2O, TMS): δ 0.76 (t, 3H, CH_3), 1.19 (m, 17H, CH_2 and CH_3), 1.63 (m, 2H, CH_2), 2.91 (s, 6H, CH_3), 3.12 (t, 2H, CH_2), 3.25 (m, 2H, CH_2), 7.03 (s, 2H, Im C4 and C5), 7.66 (s, 1H, Im C2) ppm; ^{13}C NMR (D_2O, TMS): δ 7.39 (C6), 13.77 (C18), 21.90 (C17), 22.43 (C10), 25.80 (C11), 28.68 (C12), 29.03 (C15), 29.09 (C13), 29.18 (C14), 31.65 (C16), 49.85 (C8), 49.85 (C8), 59.24 (C7), 63.11 (C9), 122.49 (C4), 122.54 (C5), 137.96 (C2) ppm; IR: ν 3152, 2923, 2854, 1577, 1467, 1381, 1323, 1024, 900, 870, 817, 721 cm^{-1}.

[C_{12}DMEA][Im]: ^{1}H NMR (D_2O, TMS): δ 0.81 (t, 3H, CH_3), 1.21 (m, 21H, CH_2 and CH_3), 1.48 (m, 2H, CH_2), 2.79 (m, 6H, CH_3), 2.94 (t, 2H, CH_2), 3.11 (m, 2H, CH_2), 6.93 (s, 2H, Im C4 and C5), 7.57 (s, 1H, Im C2) ppm; ^{13}C NMR (D_2O, TMS): δ 7.39 (C6), 13.88 (C20), 22.00 (C19), 22.62 (C10), 25.99 (C11), 28.98 (C12), 29.40 (C17), 29.45 (C13), 29.58 (C14), 29.70 (C15), 29.73 (C16), 31.92 (C18), 48.83 (C8), 48.83 (C8), 59.14 (C7), 62.93 (C9), 122.53 (C4 and C5), 138.11 (C2) ppm; IR: ν 3100, 2923, 2854, 1635, 1579, 1467, 1381, 1323, 1294, 1248, 1092, 1024, 977, 909, 818, 743 cm^{-1}.

[C_{14}DMEA][Im]: ^{1}H NMR (D_2O, TMS): δ 0.81 (t, 3H, CH_3), 1.23 (m, 25H, CH_2 and CH_3), 1.51 (m, 2H, CH_2), 2.83 (s, 6H, CH_3), 2.97 (t, 2H, CH_2), 3.13 (m, 2H, CH_2), 6.96 (s, 2H, Im C4 and C5), 7.60 (s, 1H, Im C2) ppm; ^{13}C NMR (D_2O, TMS): δ 7.42 (C6), 13.88 (C22), 22.01 (C21), 22.63 (C10), 26.00 (C11), 28.99 (C12), 28.99 (C19), 29.41 (C13), 29.45 (C14), 29.59 (C15), 29.70 (C16), 29.74 (C17), 29.74 (C18), 31.93 (C20), 49.84 (C8), 49.84 (C8), 59.15 (C7), 62.94 (C9), 122.90 (C4 and C5), 139.01 (C2) ppm; IR: ν 3106, 2923, 2853, 1578, 1467, 1385, 1323, 1248, 1141, 1092, 1022, 910, 819, 744, 722 cm^{-1}.

[C_{16}DMEA][Im]: ^{1}H NMR (D_2O, TMS): δ 0.81 (t, 3H, CH_3), 1.22 (m, 29H, CH_2 and CH_3), 1.62 (m, 2H, CH_2), 2.96 (s, 6H, CH_3), 3.13 (m, 2H, CH_2), 3.28 (m, 2H, CH_2), 7.03 (s, 2H, Im C4 and C5), 7.68 (s, 1H, Im C2) ppm; ^{13}C NMR (D_2O, TMS): δ 7.42 (C6), 13.82 (C24), 22.04 (C23), 22.61 (C10), 26.02 (C11), 29.05 (C12), 29.05 (C21), 29.46 (C13), 29.54 (C14), 29.70 (C15), 29.70 (C16), 29.79 (C17), 29.79 (C18), 29.89 (C19), 29.92 (C20), 31.94 (C22), 50.06 (C8), 50.06 (C8), 59.09 (C7), 62.75 (C9), 121.54 (C4 and C5), 136.02 (C2) ppm; IR: ν 3080, 2918, 2851, 1633, 1468, 1379, 1338, 1295, 1151, 1076, 1023, 979, 924, 836, 759, 720 cm^{-1}.

[C_8DMEA][Pyr]: ^{1}H NMR (D_2O, TMS): δ 0.77 (t, 3H, CH_3), 1.22 (m, 13H, CH_2 and CH_3), 1.62 (m, 2H, CH_2), 2.90 (s, 6H, CH_3), 3.13 (t, 2H, CH_2), 3.22 (m, 2H, CH_2), 6.32 (s, 1H, Pyr C4), 7.57 (s, 2H, Pyr C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.34 (C6), 13.66 (C16), 21.75 (C15), 22.24 (C10), 25.63 (C11), 28.44 (C12), 28.54 (C13), 31.29 (C14), 49.76 (C8), 49.76 (C8), 59.30 (C7), 63.07 (C9), 104.03 (C4), 134.88 (C3 and C5) ppm; IR: ν 3022, 2925, 2856, 1636, 1462, 1349, 1281, 1208, 1141, 1065, 1008, 980, 916, 841, 736 cm^{-1}.

[C_{10}DMEA][Pyr]: ^{1}H NMR (D_2O, TMS): δ 0.77 (t, 3H, CH_3), 1.19 (m, 17H, CH_2 and CH_3), 1.61 (m, 2H, CH_2), 2.89 (s, 6H, CH_3), 3.11 (t, 2H, CH_2), 3.23 (m, 2H, CH_2), 6.31 (s, 1H, Pyr C4), 7.61 (s, 2H, Pyr C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.38 (C6), 13.85 (C18), 21.89 (C17), 22.55 (C10), 25.87 (C11), 28.83 (C12), 29.22 (C15), 29.28 (C13), 29.36 (C14), 31.81 (C16), 49.82 (C8), 49.82 (C8), 59.14 (C7), 62.87 (C9), 103.70 (C4), 134.89 (C3 and C5) ppm; IR: ν 3050, 2923, 2854, 1714, 1636, 1464, 1378, 1350, 1281, 1213, 1143, 1011, 916, 842, 812, 736 cm^{-1}.

[C_{12}DMEA][Pyr]: ^{1}H NMR (D_2O, TMS): δ 0.84 (t, 3H, CH_3), 1.24 (m, 21H, CH_2 and CH_3), 1.44 (m, 2H, CH_2), 2.80 (s, 6H, CH_3), 2.89 (t, 2H, CH_2), 3.10 (m, 2H, CH_2), 6.18 (m, 1H, Pyr C4), 7.53 (d, 2H, Pyr C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.41 (C6), 13.88 (C20), 21.99 (C19), 22.63 (C10), 25.99 (C11), 28.98 (C12), 29.41 (C17), 29.45 (C13), 29.58 (C14), 29.70 (C15), 29.74 (C16), 31.93 (C18), 49.85 (C8), 49.85 (C8), 59.14 (C7), 62.90 (C9), 103.72 (C4), 138.16 (C3 and C5) ppm; IR: ν 3032, 2923, 2853, 1635, 1465, 1378, 1351, 1280, 1213, 1143, 1014, 917, 842, 812, 738 cm^{-1}.

[C_{14}DMEA][Pyr]: ^{1}H NMR (D_2O, TMS): δ 0.84 (t, 3H, CH_3), 1.24 (m, 25H, CH_2 and CH_3), 1.46 (m, 2H, CH_2), 2.81 (s, 6H, CH_3), 2.91 (t, 2H, CH_2), 3.10 (m, 2H, CH_2), 6.21 (m, 1H, Pyr C4), 7.55 (m, 2H, Pyr C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.42 (C6), 13.89 (C22), 21.96 (C21), 22.65 (C10), 25.99 (C11), 29.01 (C12), 29.01 (C19), 29.46 (C13), 29.50 (C14), 29.63 (C15), 29.63 (C16), 29.75 (C17), 29.79 (C18), 31.97 (C20), 49.87 (C8), 49.87 (C8), 59.11 (C7), 62.77 (C9), 103.53 (C4), 134.80 (C3 and C5) ppm; IR: ν 3070, 2922, 2853, 1640, 1465, 1394, 1351, 1308, 1282, 1216, 1144, 1014, 918, 844, 737 cm^{-1}.

[C_{16}DMEA][Pyr]: ^{1}H NMR (D_2O, TMS): δ 0.82 (t, 3H, CH_3), 1.22 (m, 29H, CH_2 and CH_3), 1.53 (m, 2H, CH_2), 2.91 (s, 6H, CH_3), 3.04 (t, 2H, CH_2), 3.20 (m, 2H, CH_2), 6.26 (m, 1H, Pyr C4), 7.58 (m, 2H, Pyr C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.41 (C6), 13.83 (C24), 22.00 (C23), 22.63 (C10), 25.98 (C11), 29.04 (C12), 29.04 (C21), 29.49 (C13), 29.49 (C14), 29.54 (C15), 29.54 (C16), 29.71 (C17), 29.71 (C18), 29.82 (C19), 29.95 (C20), 31.97 (C22), 50.04 (C8), 50.04 (C8), 59.08 (C7), 62.72

(C9), 104.49 (C4), 133.88 (C3 and C5) ppm; IR: ν 3020, 2917, 2850, 1632, 1468, 1377, 1281, 1143, 1007, 990, 927, 889, 838, 752 cm^{-1}.

[C_8DMEA][Triz]: ^{1}H NMR (D_2O, TMS): δ 0.77 (t, 3H, CH_3), 1.20 (m, 13H, CH_2 and CH_3), 1.60 (m, 2H, CH_2), 2.87 (s, 6H, CH_3), 3.10 (t, 2H, CH_2), 3.22 (m, 2H, CH_2), 8.03 (s, 2H, Triz C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.34 (C6), 13.56 (C16), 21.71 (C15), 22.10 (C10), 25.53 (C11), 28.26 (C12), 28.32 (C13), 31.11 (C14), 49.74 (C8), 49.74 (C8), 59.29 (C7), 63.33 (C9), 149.61 (C3 and C5) ppm; IR: ν 3073, 2925, 2857, 1644, 1470, 1378, 1240, 1183, 1142, 1020, 962, 926, 849, 814, 723, 683 cm^{-1}.

[C_{10}DMEA][Triz]: ^{1}H NMR (D_2O, TMS): δ 0.79 (t, 3H, CH_3), 1.20 (m, 17H, CH_2 and CH_3), 1.58 (m, 2H, CH_2), 2.86 (s, 6H, CH_3), 3.07 (t, 2H, CH_2), 3.20 (m, 2H, CH_2), 8.02 (s, 2H, Triz C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.38 (C6), 13.82 (C18), 21.91 (C17), 22.49 (C10), 25.84 (C11), 28.75 (C12), 29.12 (C15), 29.17 (C13), 29.26 (C14), 31.72 (C16), 49.82 (C8), 49.82 (C8), 59.25 (C7), 63.12 (C9), 149.56 (C3 and C5) ppm; IR: ν 3053, 2920, 2837, 1643, 1455, 1387, 1220, 1153, 1112, 1020, 972, 936, 849, 804, 723, 683 cm^{-1}.

[C_{12}DMEA][Triz]: ^{1}H NMR (D_2O, TMS): δ 0.83 (t, 3H, CH_3), 1.24 (m, 21H, CH_2 and CH_3), 1.52 (m, 2H, CH_2), 2.82 (s, 6H, CH_3), 2.99 (t, 2H, CH_2), 3.15 (m, 2H, CH_2), 8.00 (s, 2H, Triz C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.41 (C6), 13.87 (C20), 22.01 (C19), 23.42 (C10), 26.00 (C11), 28.99 (C12), 29.41 (C17), 29.46 (C13), 29.59 (C14), 29.70 (C15), 29.74 (C16), 31.92 (C18), 49.87 (C8), 49.87 (C8), 59.21 (C7), 63.01 (C9), 148.76 (C3 and C5) ppm; IR: ν 3025, 2923, 2854, 1582, 1470, 1380, 1271, 1242, 1143, 1063, 1022, 962, 928, 854, 814, 722, 683 cm^{-1}.

[C_{14}DMEA][Triz]: ^{1}H NMR (D_2O, TMS): δ 0.82 (t, 3H, CH_3), 1.23 (m, 25H, CH_2 and CH_3), 1.55 (m, 2H, CH_2), 2.84 (s, 6H, CH_3), 3.02 (t, 2H, CH_2), 3.18 (m, 2H, CH_2), 8.00 (s, 2H, Triz C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.34 (C6), 13.87 (C22), 21.95 (C21), 22.63 (C10), 25.97 (C11), 29.01 (C12), 29.01 (C19), 29.48 (C13), 29.52 (C14), 29.68 (C15), 29.80 (C16), 29.89 (C17), 29.89 (C18), 31.96 (C20), 49.77 (C8), 49.77 (C8), 59.07 (C7), 62.87 (C9), 149.78 (C3 and C5) ppm; IR: ν 3050, 2923, 2854, 1583, 1469, 1379, 1270, 1240, 1184, 1142, 1022, 962, 928, 851, 814, 721, 684 cm^{-1}.

[C_{16}DMEA][Triz]: ^{1}H NMR (D_2O, TMS): δ 0.77 (t, 3H, CH_3), 1.18 (m, 29H, CH_2

and CH_3), 1.36 (m, 2H, CH_2), 2.68 (s, 6H, CH_3), 2.81 (t, 2H, CH_2), 2.98 (m, 2H, CH_2), 7.88 (s, 2H, Triz C3 and C5) ppm; ^{13}C NMR (D_2O, TMS): δ 7.37 (C6), 13.88 (C24), 21.97 (C23), 22.66 (C10), 26.00 (C11), 29.07 (C12), 29.07 (C21), 29.54 (C13), 29.54 (C20), 29.59 (C14), 29.59 (C19), 29.76 (C15), 29.76 (C18), 29.87 (C16), 30.01 (C17), 32.00 (C22), 49.79 (C8), 49.79 (C8), 59.06 (C7), 62.83 (C9), 149.57 (C3 and C5) ppm; IR: ν 3020, 2917, 2850, 1629, 1470, 1375, 1337, 1235, 1186, 1140, 1024, 971, 930, 838, 719, 684 cm^{-1}.

2. Determination of bromide content in the ILs.

Bromide contents in the ILs were determined by means of a Br^- selective electrode (Shanghai Precision & Scientific Instrument Co. Ltd) coupled with a 6802 saturated calomel electrode, and a PHSJ-4F digital pH meter was used to measure the potentials. The measurements were conducted at 25 ± 0.1 ℃, and calibration curves were obtained from the potential values against concentrations of aqueous solutions of the corresponding precursor bromide ionic liquids. Each experiment was performed in triplicate, and the reproducibility was within 2%.

3. Analysis of the composition of the aqueous phase after phase separation.

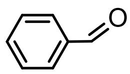
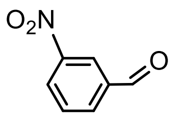
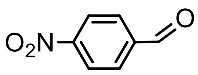
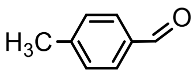
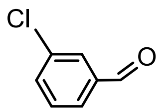
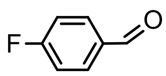
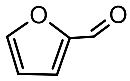
The concentration of the residual ILs in the aqueous solution after phase separation was determined by spectrophotometric method.[1-3] Briefly, we prepared a given concentration of aqueous IL solutions saturated with CO_2 at 25 °C as mother-liquid of sample firstly. Then, a series of different concentrations of the ILs-CO_2 aqueous solutions were obtained by diluting the above sample solution under an atmosphere of carbon dioxide. The absorbance of each of them was measured in a 1 cm cell, and then standard curve was established through fitting the absorbance intensity with different concentrations of IL. Taking [C_{12}DMEA][Im] as an example, a series of standard solutions of the IL reacted with CO_2 were prepared and their absorbance intensity was measured at 206 nm, respectively. The absorbance intensity of [C_{12}DMEA][Im] was obtained as a linear function of the IL content in water (Figure S16). Thus, the content of the residual [C_{12}DMEA][Im] in the aqueous solution after phase separation could be read from the standard curve by measuring its corresponding absorbance intensity.

Tables S1-S2

Table S1. The droplet size of n-pentanol/[C_{12}DMEA][Im]/H_2O microemulsions as a function of water content at 25 °C.

microemulsion	R	Size distribution (nm)	Mean (nm)	PDI	Number (%)
n-pentanol/[C_{12}DMEA][Im]/H_2O	9.28	1.5 ~ 2.7	2.0	0.209	100
	19.30	4.2 ~ 8.7	5.6	0.176	100
	31.38	6.5 ~ 15.7	8.7	0.151	100
	43.26	7.5 ~ 15.7	10.1	0.124	100
	57.01	7.9 ~ 28.2	15.7	0.222	100

Table S2. Yields for the reactions of aromatic aldehydes with malononitrile in [C_{12}DMEA][Im] based microemulsions.

Entry	R[a]	Yield (%)[b]
1		97.2
2		93.2
3		98.3
4		94.5
5		95.0
6		96.2
7		98.7

[a] All of these reactions were performed with aldehyde (1.05 mmol) and malononitrile (1.00 mmol) in 1.5 mL of microemulsion at 25 ℃ for 1h.

[b] Determined by ^{1}H NMR using anisole as an internal standard.

Figures S1-S27

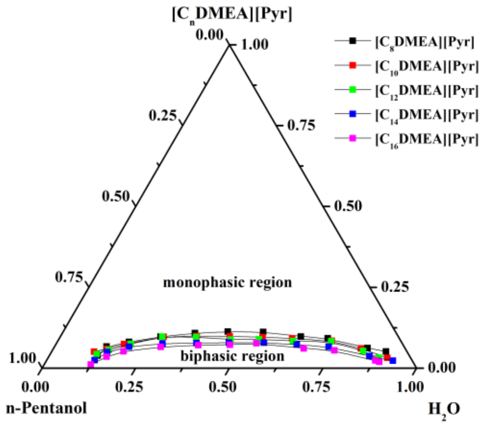


Figure S1. Phase diagrams of the n-pentanol/[C_nDMEA][Pyr] (n = 8, 10, 12, 14, 16)/H_2O microemulsions (in mass fraction) at 25.0 ℃.

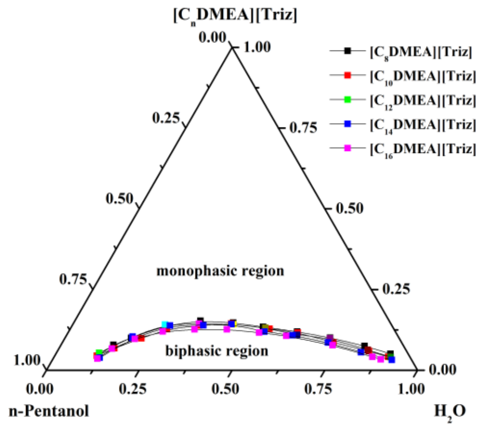


Figure S2. Phase diagrams of the n-pentanol/[C_nDMEA][Triz] (n = 8, 10, 12, 14, 16)/H_2O microemulsions (in mass fraction) at 25.0 ℃.

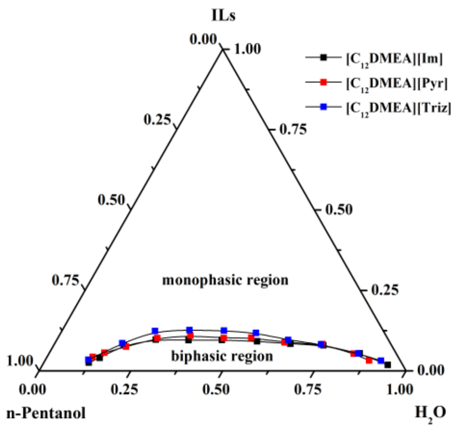


Figure S3. Phase diagrams of the n-pentanol/[C_{12}DMEA][Im]/H_2O (black), n-pentanol/[C_{12}DMEA][Pyr]/H_2O (red) and n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsions (blue) at 25.0 ℃.

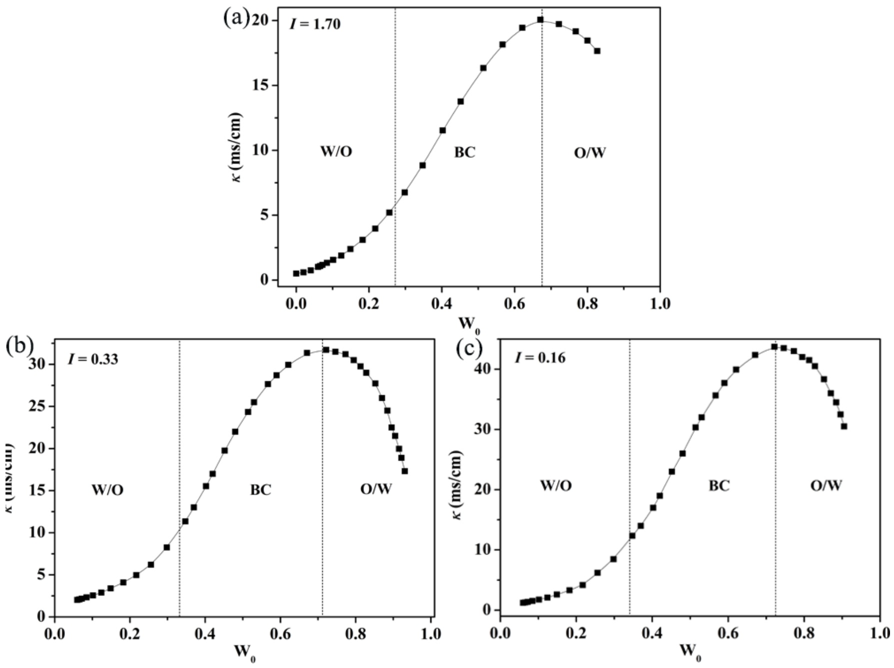


Figure S4. Electrical conductivity of the n-pentanol/[C_{12}DMEA][Im]/H_2O microemulsion as a function of water content (W_0) at different *I* values as stated at 25.0 ^{o}C.

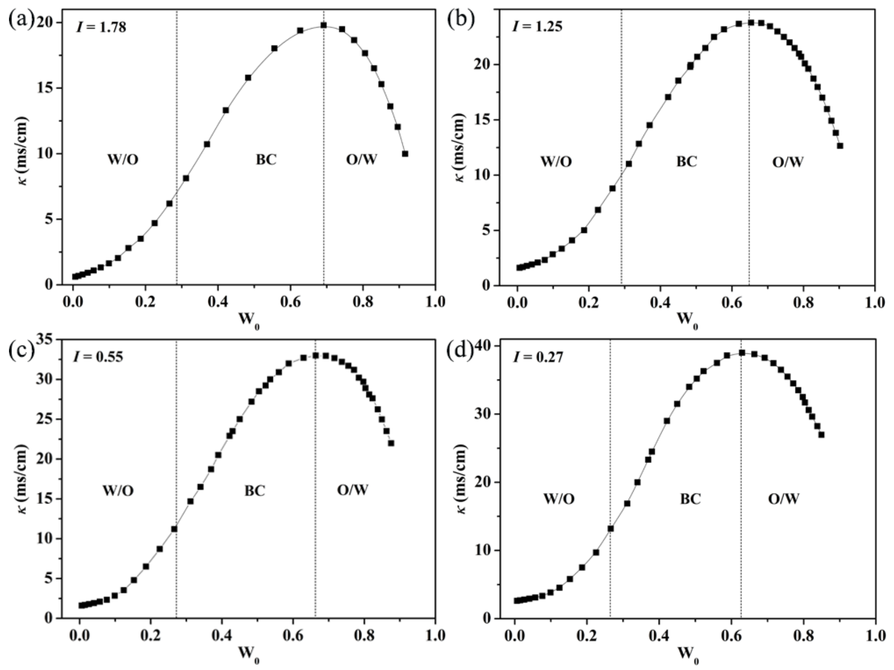


Figure S5. Electrical conductivity of the n-pentanol/[C_{12}DMEA][Pyr]/H_2O microemulsion as a function of water content (W_0) at different *I* values as stated at 25.0 ^{o}C.

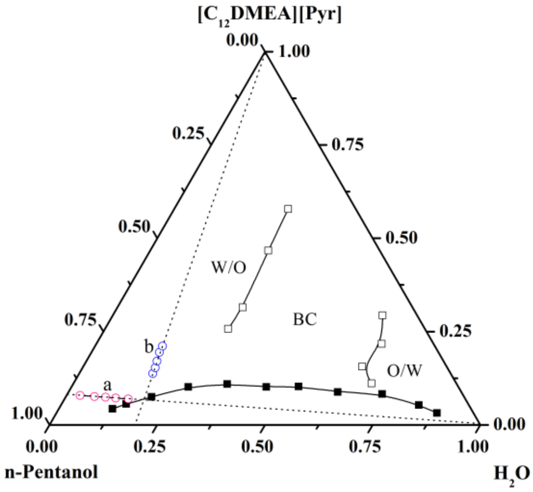


Figure S6. Phase diagram of the n-pentanol/[C_{12}DMEA][Pyr]/H_2O microemulsion at 25.0 ℃ with different types of microstructure; Circles (pink and blue) were results from DLS measurements.

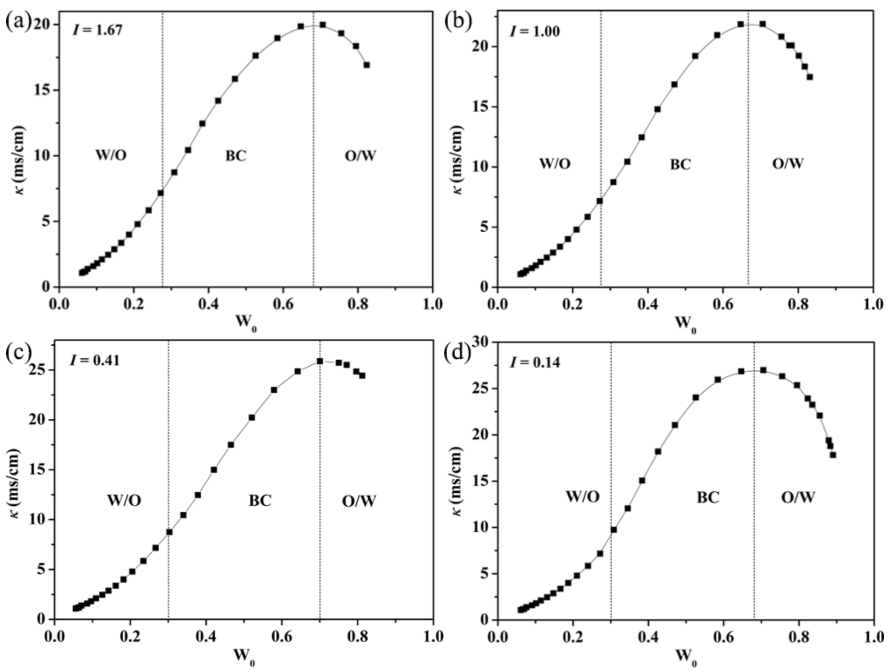


Figure S7. Electrical conductivity of the n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsion as a function of water content (W_0) at different I values as stated at 25.0 ^{o}C.

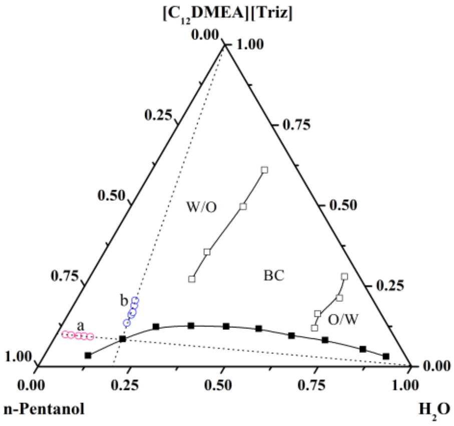


Figure S8. Phase diagram of the n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsion with different types of microstructure at 25.0 ℃; Circles (pink and blue) were results from DLS measurements.

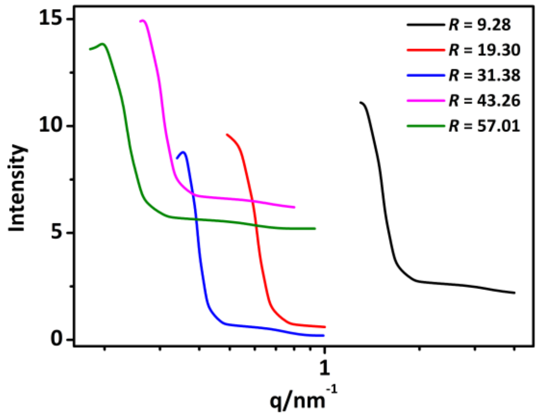


Figure S9. SAXS curves of the n-pentanol/[C_{12}DMEA][Im]/H_2O microemulsion droplets at I = 9.0 (n-pentanol/[C_{12}DMEA][Im], 9:1, w/w) and different R values (R = H_2O/[C_{12}DMEA][Im] molar ratio) as stated.

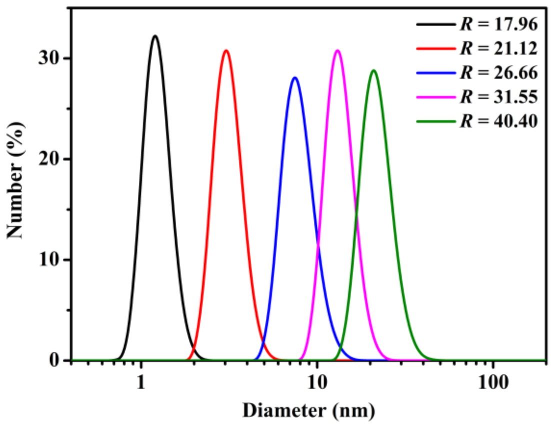


Figure S10. Size distribution of the n-pentanol/[C_{12}DMEA][Im]/H_2O microemulsion droplets (n-pentanol/H_2O, 4 : 1, w/w) at different R (molar ratio of H_2O to [C_{12}DMEA][Im]) values.

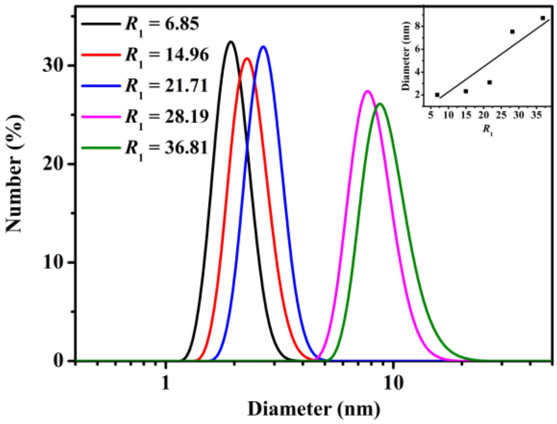


Figure S11. Size distribution of the n-pentanol/[C_{12}DMEA][Pyr]/H_2O microemulsion droplets (n-pentanol/[C_{12}DMEA][Pyr], 11.3 : 1.0, w/w) and different R_1 (molar ratio of H_2O to [C_{12}DMEA][Pyr]) values.

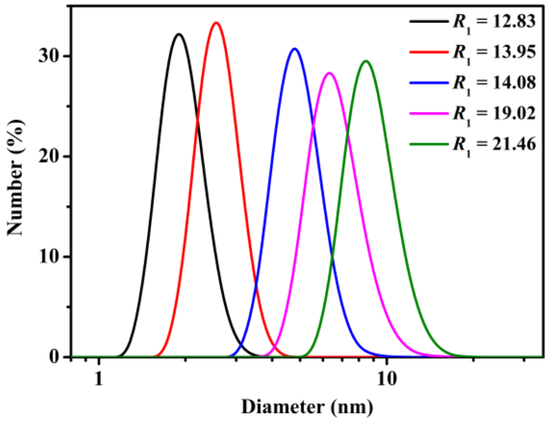


Figure S12. Size distributions of the n-pentanol/[C_{12}DMEA][Pyr]/H_2O microemulsion droplets (n-pentanol/H_2O, 4 : 1, w/w) at different R_1 (molar ratio of H_2O to [C_{12}DMEA][Pyr]) values.

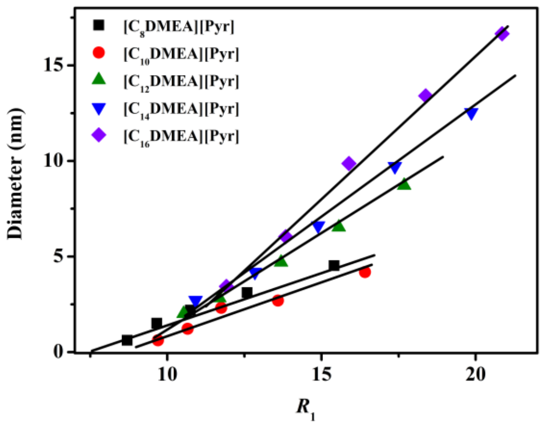


Figure S13. Linear correlation of size of the n-pentanol/[C_nDMEA][Pyr] (n= 8, 10, 12, 14, 16)/H_2O microemulsion droplets with the R_1 values (molar ratio of H_2O to [C_{12}DMEA][Pyr]) at 25.0 ℃.

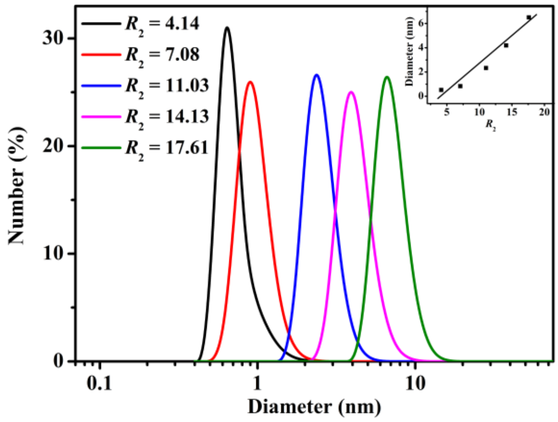


Figure S14. Size distribution of the n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsion droplets (n-pentanol/[C_{12}DMEA][Triz], 8.8 : 1.0, w/w) and different R_2 values (molar ratio of H_2O to [C_{12}DMEA][Triz]) values.

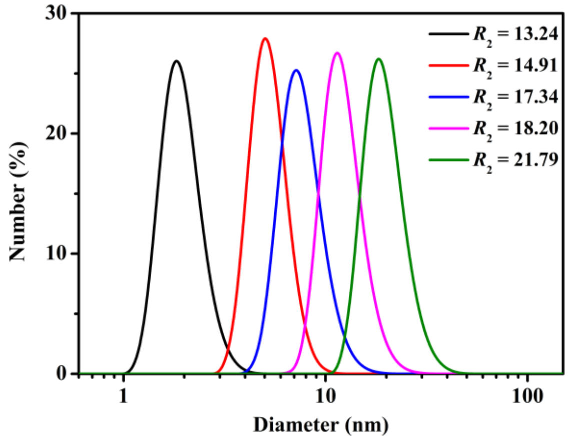


Figure S15. Size distribution of the n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsion droplets (n-pentanol/H_2O, 4 : 1, w/w) at different R_2 values (molar ratio of H_2O to [C_{12}DMEA] [Triz]).

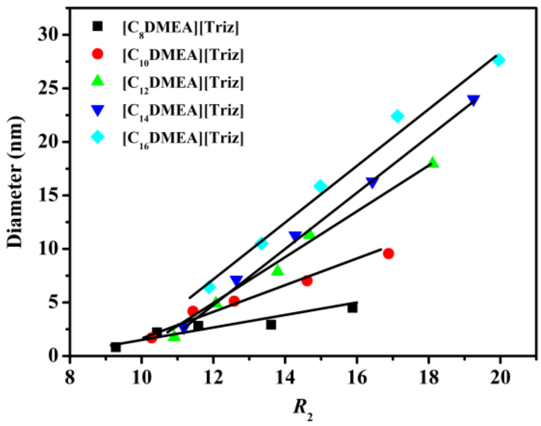


Figure S16. Linear correlation of size of the n-pentanol/[C_nDMEA][Triz] (n= 8, 10, 12, 14, 16)/H_2O microemulsion droplets with the R_2 values at 25.0 ℃.

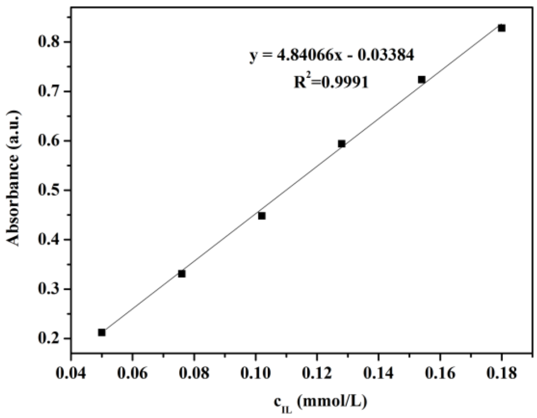


Figure S17. Linear change of absorbance intensity with concentrations of [C_{12}DMEA][Im]-CO_2 in water at 206 nm.

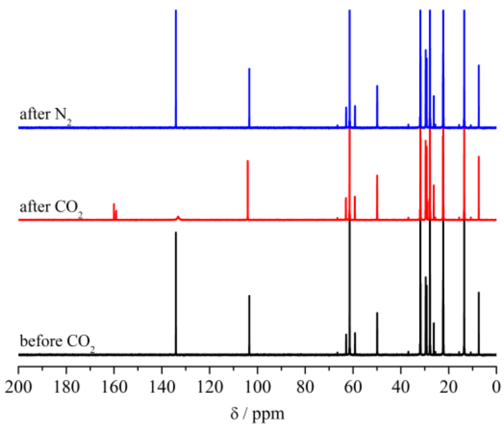


Figure S18. ^{13}C NMR spectra of [C_{12}DMEA][Pyr] in the n-pentanol/[C_{12}DMEA][Pyr]/H_2O microemulsion system before bubbling of CO_2 and after bubbling of N_2 as well as in the aqueous solution after phase separation.

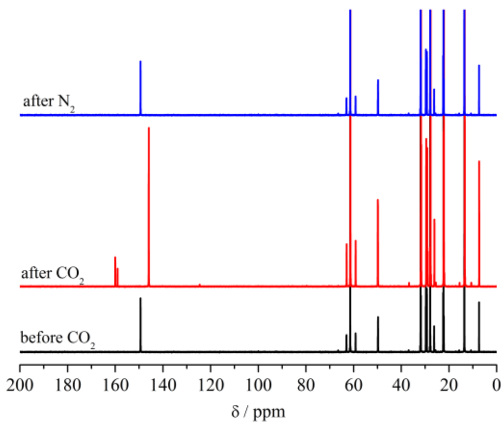


Figure S19. ^{13}C NMR of [C_{12}DMEA][Triz] in the n-pentanol/[C_{12}DMEA][Triz]/H_2O microemulsions system before bubbling of CO_2 and after bubbling of N_2 as well as in the aqueous solution after phase separation.

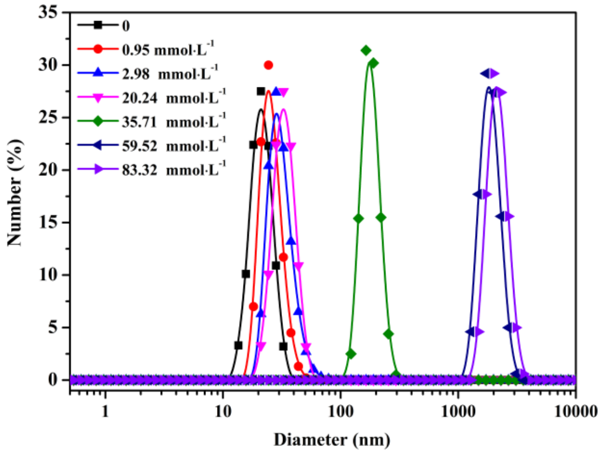


Figure S20. Change in size of the n-pentanol/[C_{12}DMEA][Im]/H_2O system with increasing concentrations of sodium bicarbonate.

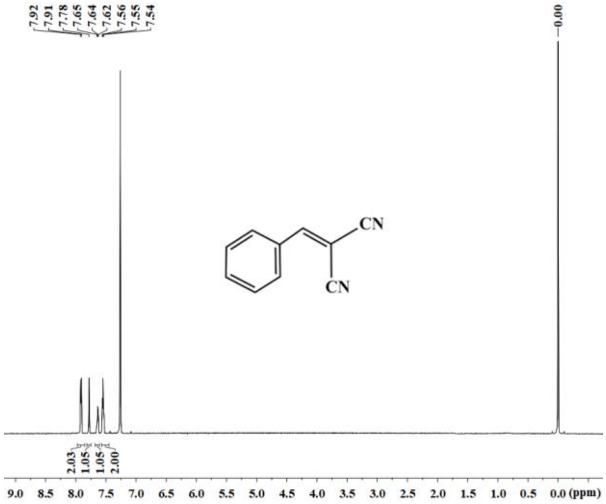


Figure S21. ^{1}H NMR spectrum of 2-benzylidenemalononitrile in $CDCl_3$.

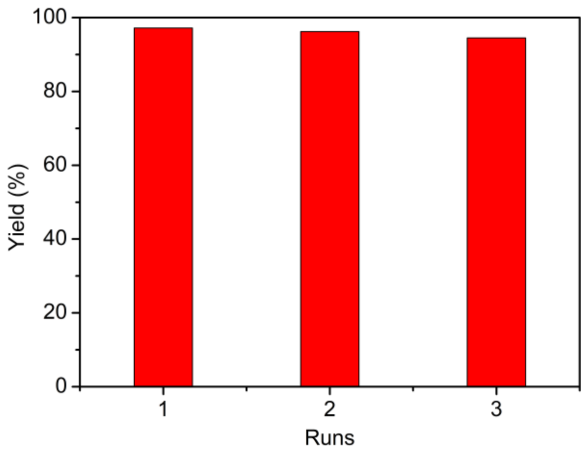


Figure S22. The reusability of [C_{12}DMEA][Im] based microemulsion in the reaction of benzaldehyde and malononitrile (1, 97.2%; 2, 96.2%; and 3, 94.5%).

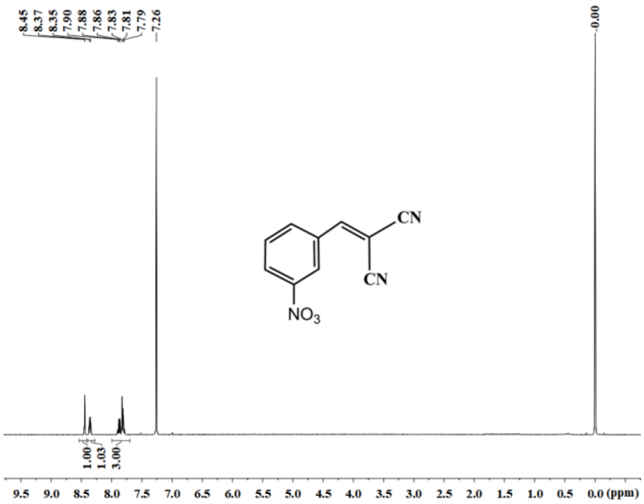


Figure S23. ^{1}H NMR spectrum of 3-(2,2-dicyanovinyl)phenyl nitrate in $CDCl_3$.

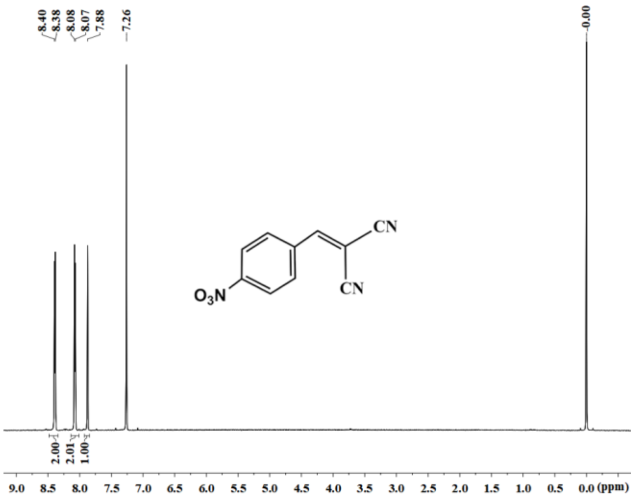


Figure S24. ^{1}H NMR spectrum of 4-(2,2-dicyanovinyl)phenyl nitrate in $CDCl_3$.

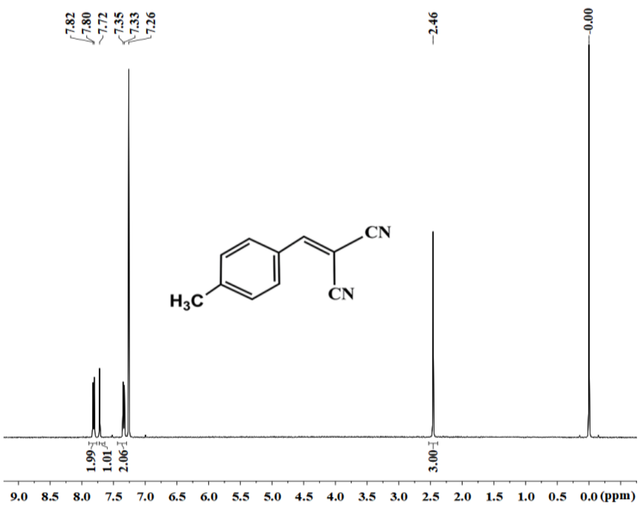


Figure S25. ^{1}H NMR spectrum of 2-(4-methylbenzylidene)malononitrile in $CDCl_3$.

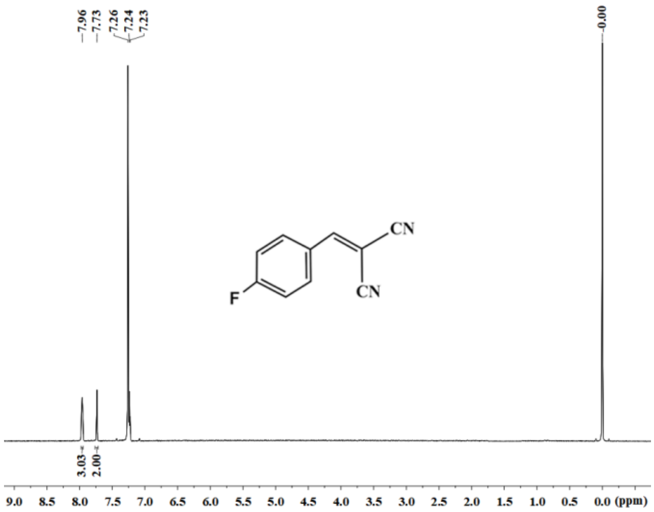


Figure S26. ^{1}H NMR spectrum of 2-(4-fluorobenzylidene)malononitrile in $CDCl_3$.

Figure S27. ^{1}H NMR spectrum of 2-(furan-2-ylmethylene)malononitrile in $CDCl_3$.

References

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