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γ-valerolactone (GVL) as a bio-based green solvent and ligand for iron-mediated AGET ATRP

Supplementary material

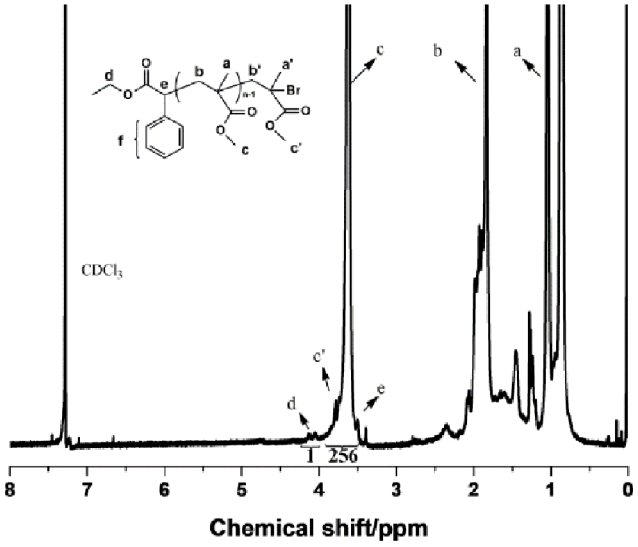

Figure S1: ^{1}H NMR spectrum of PMMA ($M_{n,NMR}$ = 17.3×10^3 g/mol, $M_{n,GPC}$ = 15.9 ×10^3 g/mol, M_w/M_n = 1.27) with $CDCl_3$ as the solvent. Experiment conditions: $[MMA]_0/[EBPA]_0/[FeBr_3]_0/[AsAc\text{-}Na]_0$ = 200/1/0.5/1 at 75°C. Solvent = γ-valerolactone, V_{MMA} = 3 mL, $V_{solvent}$ = 1.5 mL. Reaction time = 5 h. Conversion = 70.1%.

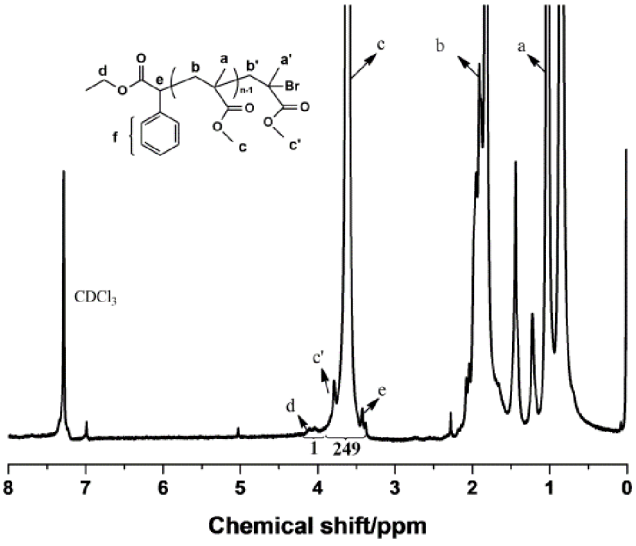

Figure S2: ^{1}H NMR spectrum of PMMA ($M_{n,NMR}$ = 16.8×10^3 g/mol, $M_{n,GPC}$ = 15.2 ×10^3 g/mol, M_w/M_n = 1.25) with $CDCl_3$ as the solvent. Experiment conditions: $[MMA]_0/[EBPA]_0/[FeBr_3]_0/[AsAc\text{-}Na]_0$ = 200/1/0.5/1 at 75°C. Solvent = γ-butyrolactone, V_{MMA} = 3 mL, $V_{solvent}$ = 1.5 mL. Reaction time = 5 h. Conversion = 66.1%.

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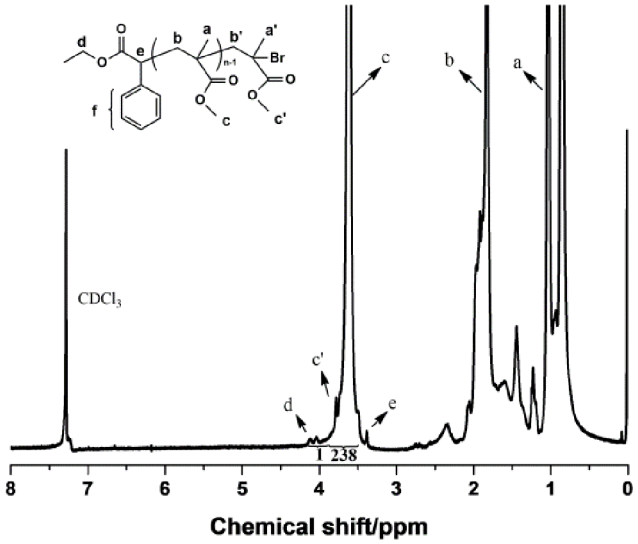

Figure S3: ^{1}H NMR spectrum of PMMA ($M_{n,NMR}$ = 16.1×10^3 g/mol, $M_{n,GPC}$ = 13.5 ×10^3 g/mol, M_w/M_n = 1.25) with $CDCl_3$ as the solvent. Experiment conditions: $[MMA]_0/[EBPA]_0/[FeBr_3]_0/[AsAc\text{-}Na]_0$ = 200/1/0.5/1 at 75°C. Solvent = γ-caprolactone, V_{MMA} = 3 mL, $V_{solvent}$ = 1.5 mL. Reaction time = 5 h. Conversion = 59.8%.

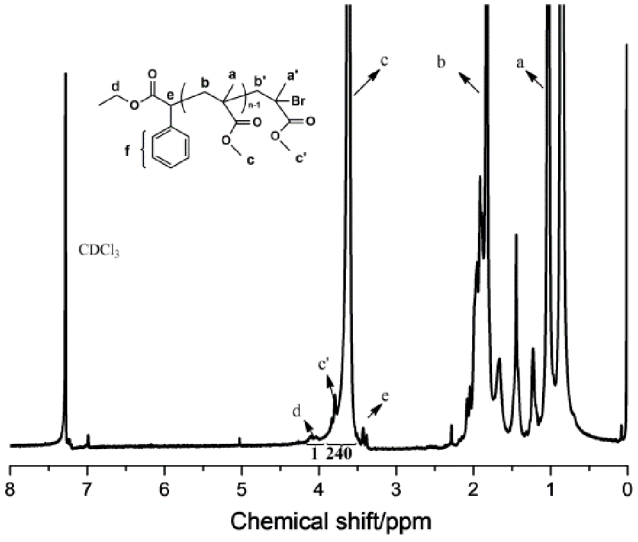

Figure S4: ^{1}H NMR spectrum of PMMA ($M_{n,NMR}$ = 16.3×10^3 g/mol, $M_{n,GPC}$ = 13.8 ×10^3 g/mol, M_w/M_n = 1.25) with $CDCl_3$ as the solvent. Experiment conditions: $[MMA]_0/[EBPA]_0/[FeBr_3]_0/[AsAc\text{-}Na]_0$ = 200/1/0.5/1 at 75°C. Solvent = γ-octanolactone, V_{MMA} = 3 mL, $V_{solvent}$ = 1.5 mL. Reaction time = 5 h. Conversion = 61.2%.

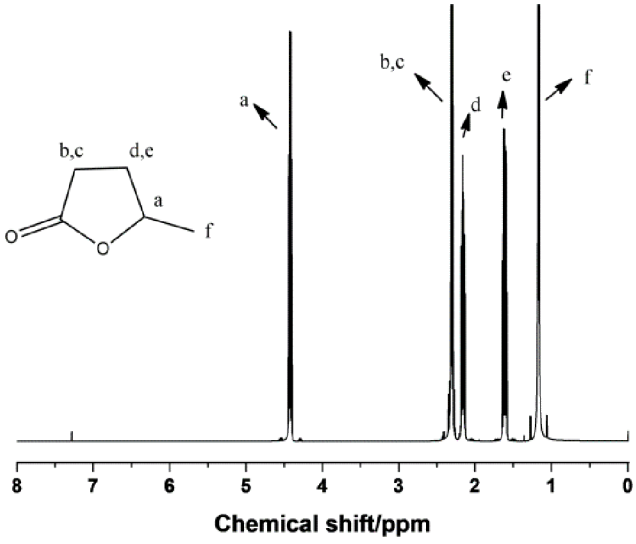

Figure S5: ^{1}H NMR spectrum of γ-valerolactone.