Supporting Information

Sonochemistry-assisted Photocontrolled Atom Transfer Radical Polymerization Enabled by Manganese Carbonyl

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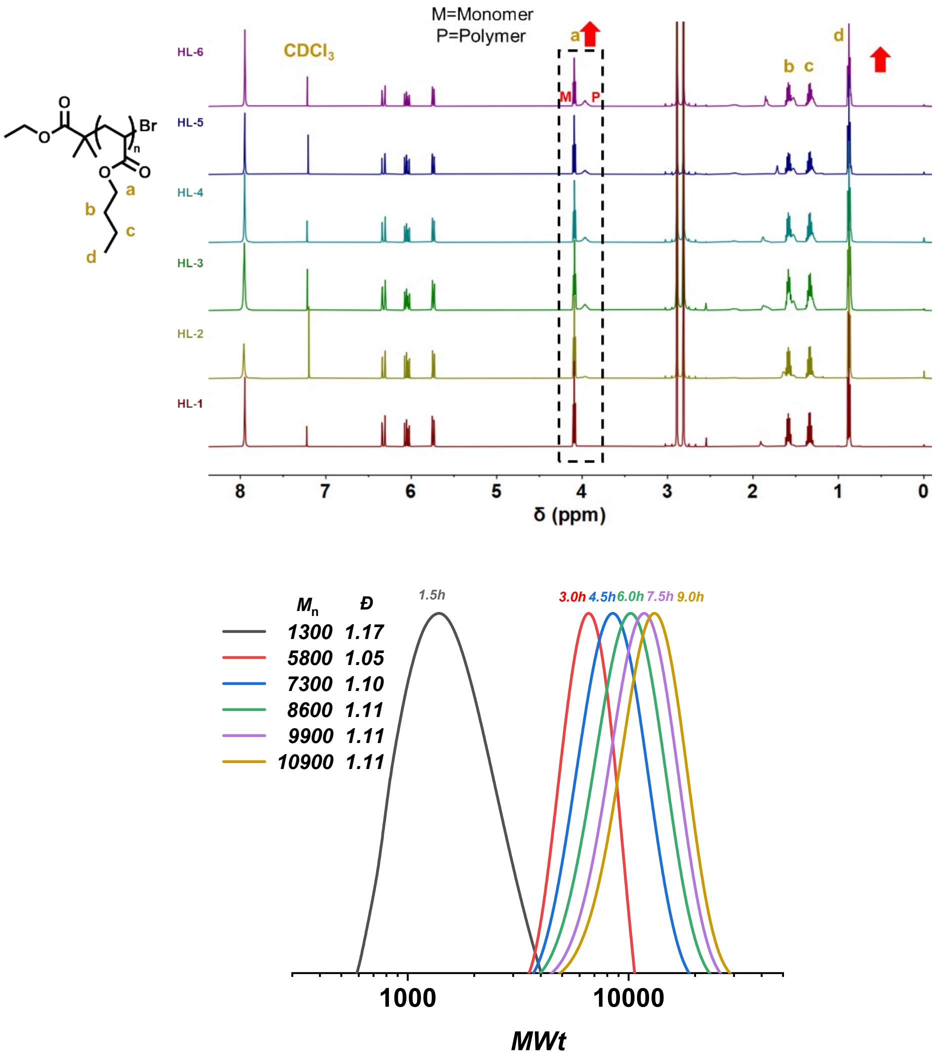


Figure S1. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA under the irradiation of single hood light, and the GPC traces.

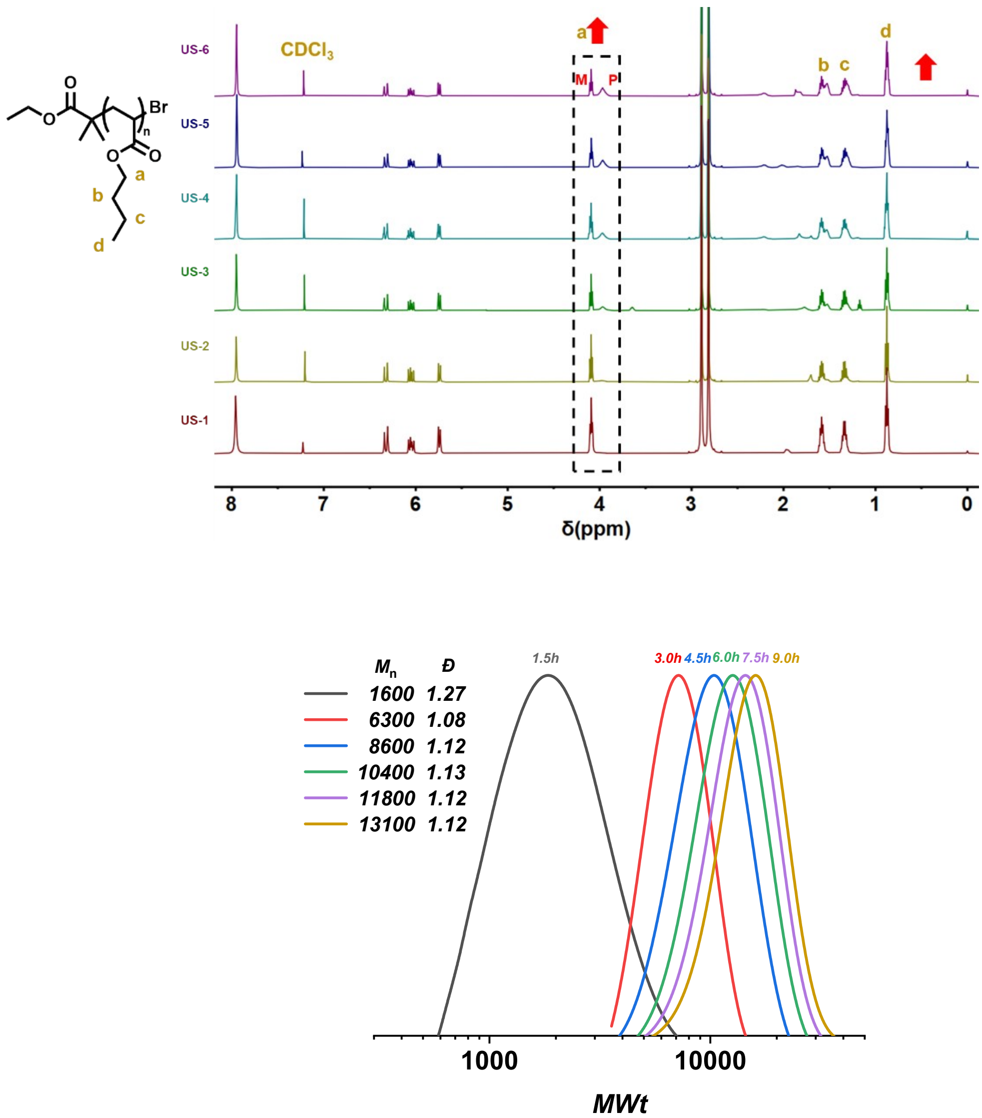


Figure S2. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA under ultrasound, and the GPC traces.

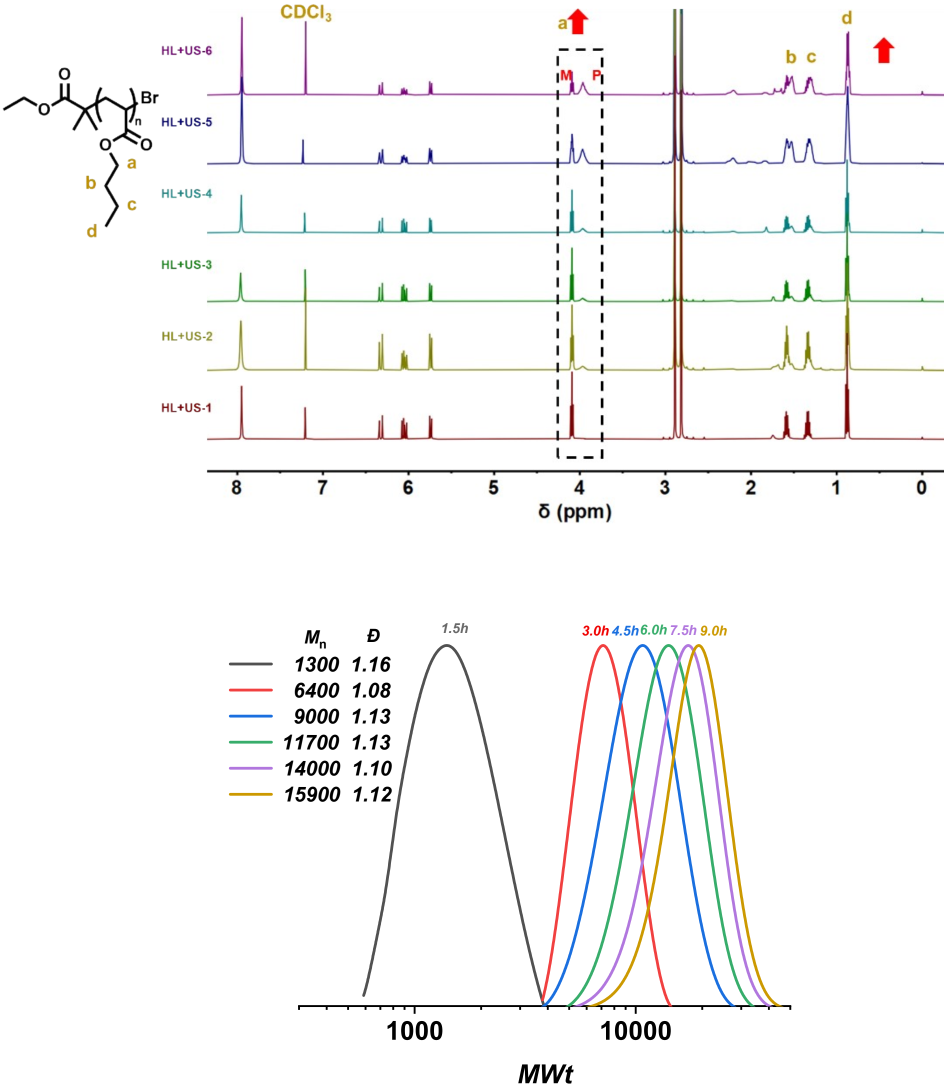


Figure S3. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA under both the irradiation of hood light and ultrasound, and the GPC traces.

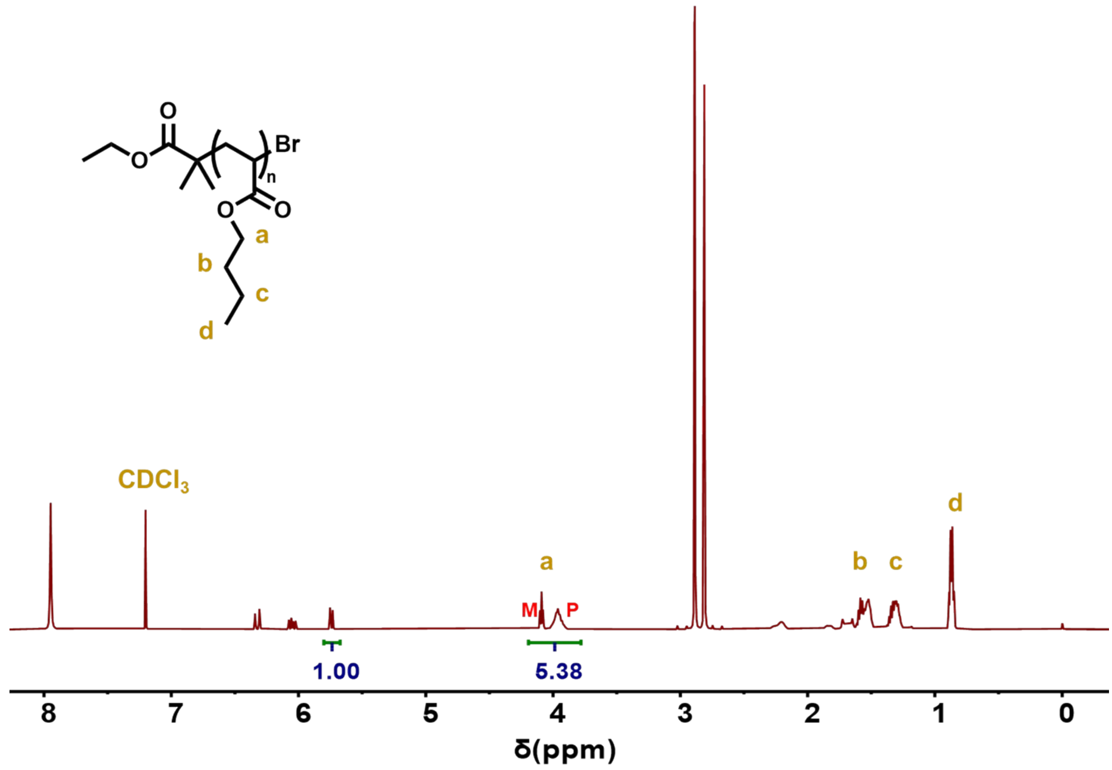


Figure S4. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA with $DP_T = 200$.

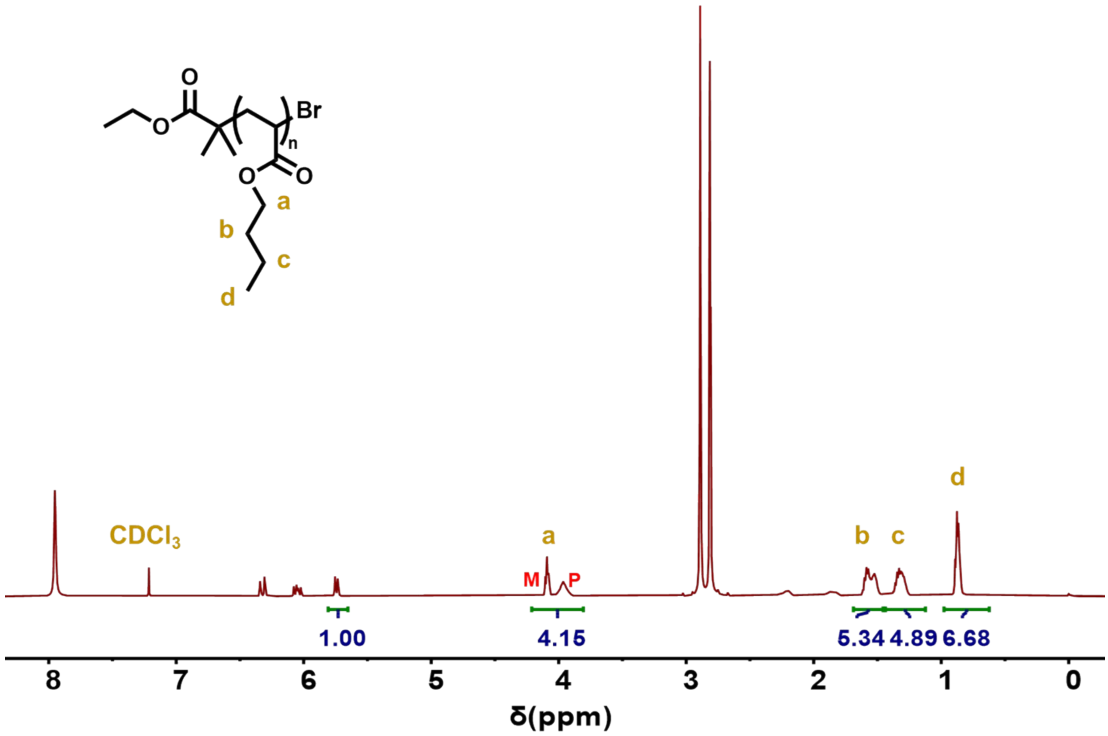


Figure S5. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA with $DP_T = 300$.

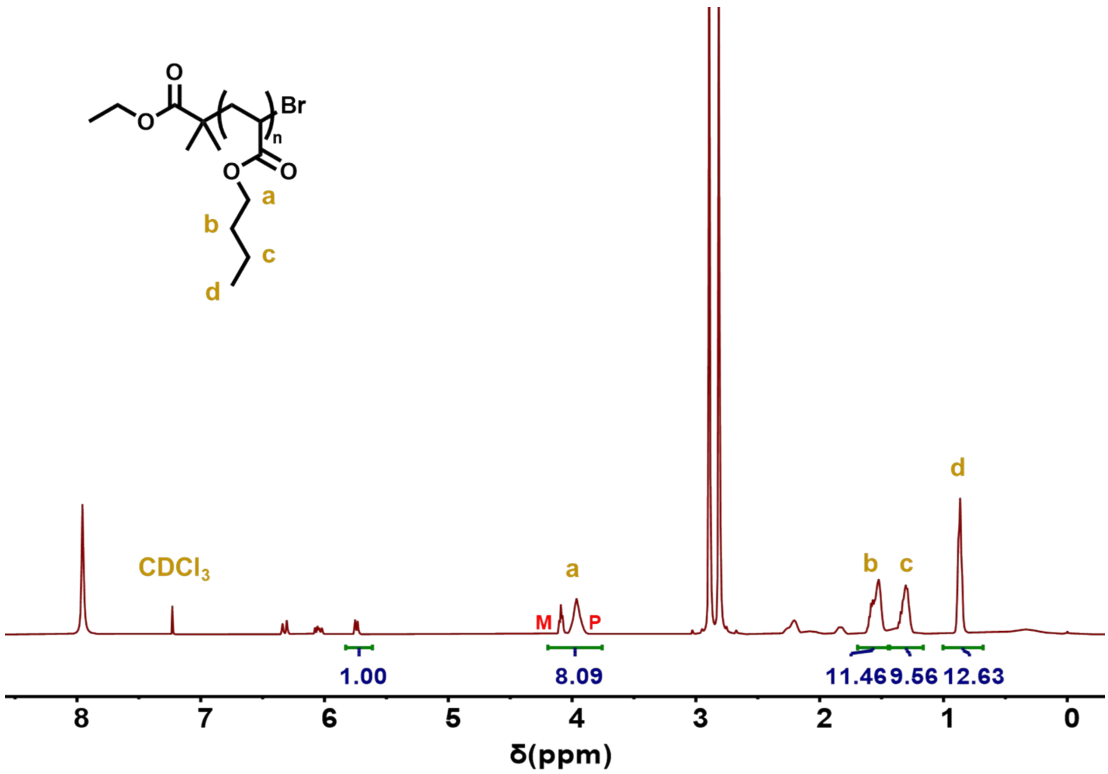


Figure S6. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA with $DP_T = 400$.

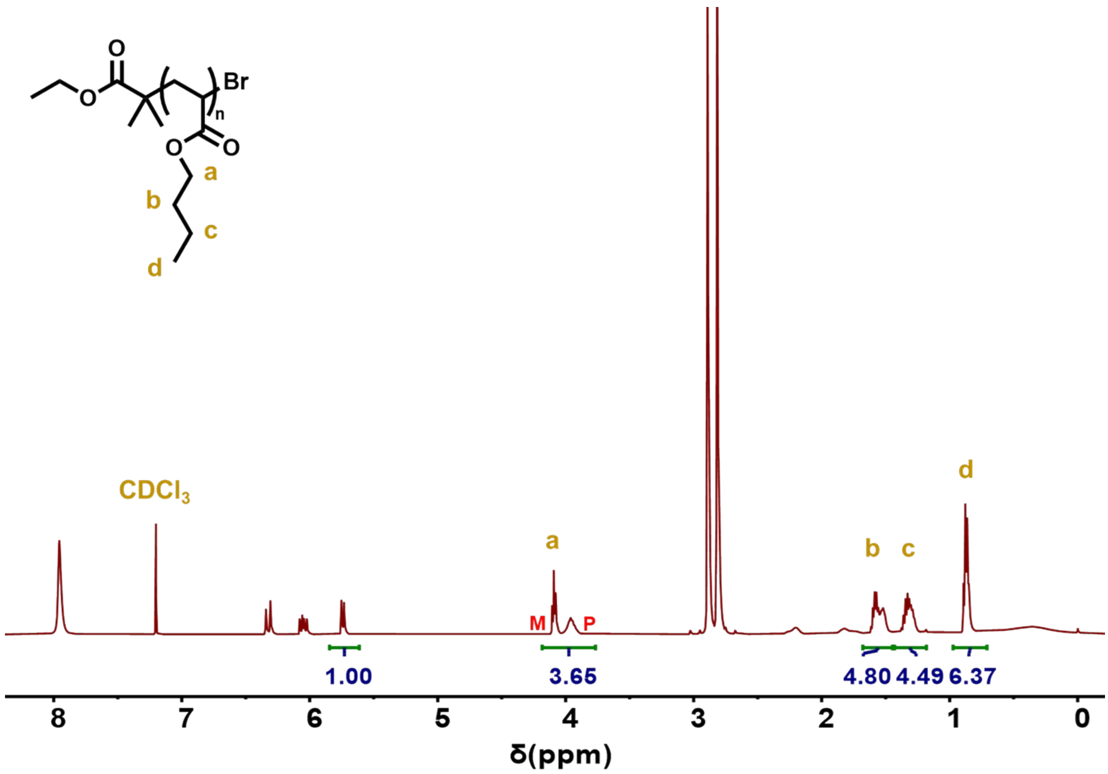


Figure S7. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA with $DP_T = 800$.

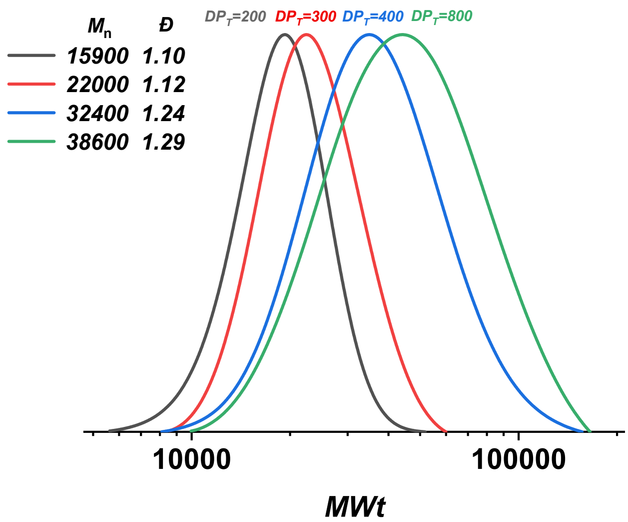
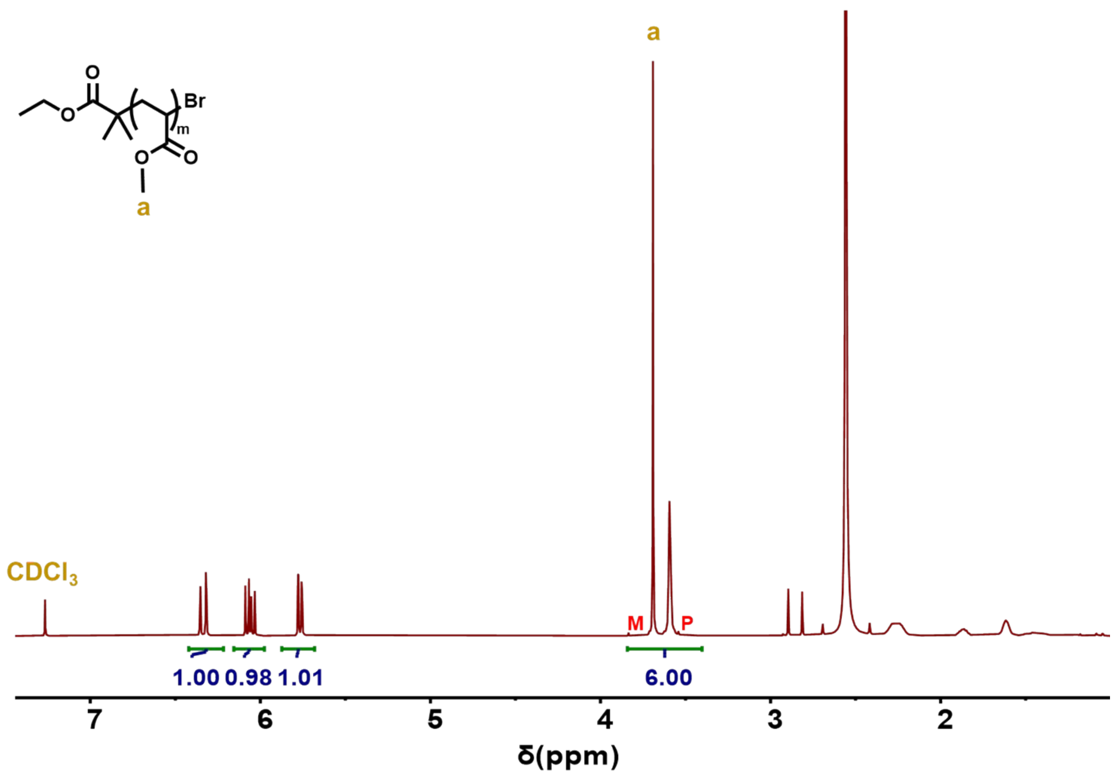


Figure S8. GPC traces of SAP-ATRP of BA with different DP_T.



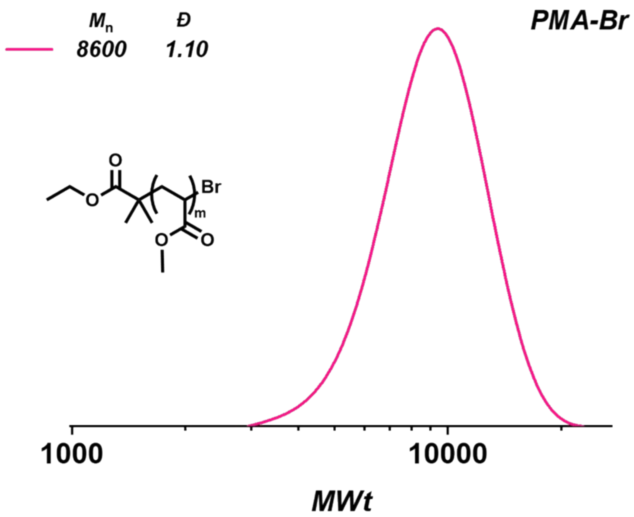
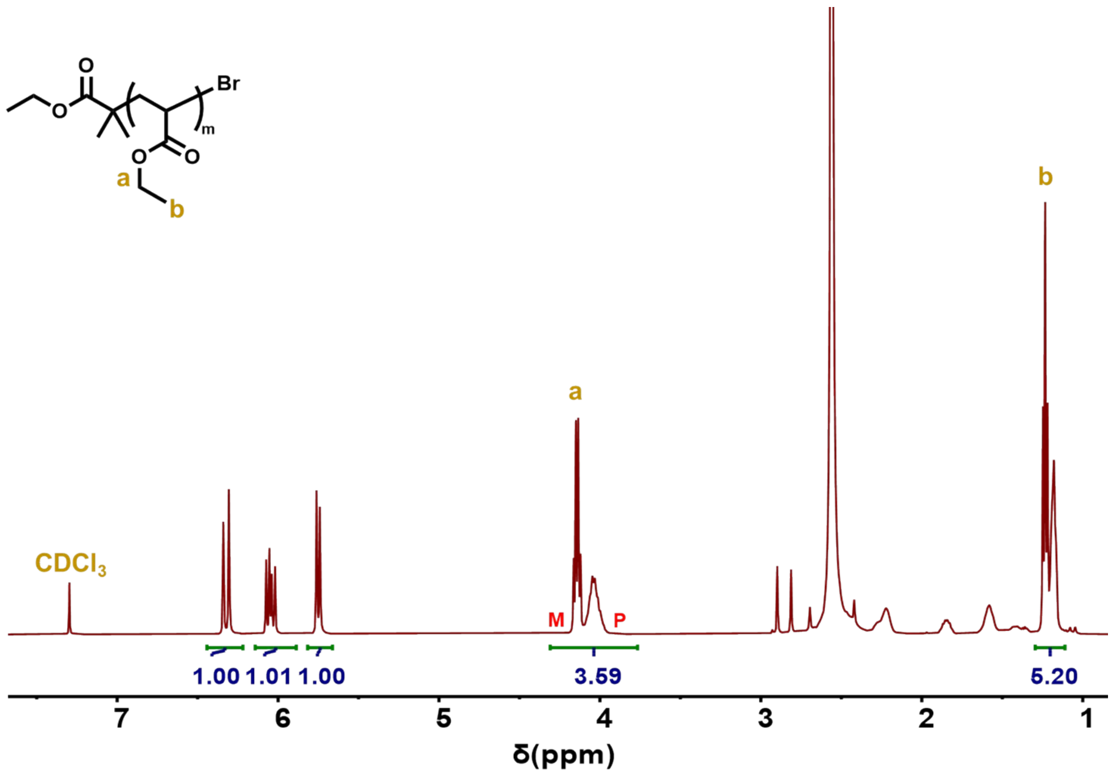


Figure S9. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of MA under both the irradiation of hood light and ultrasound, and the GPC trace.



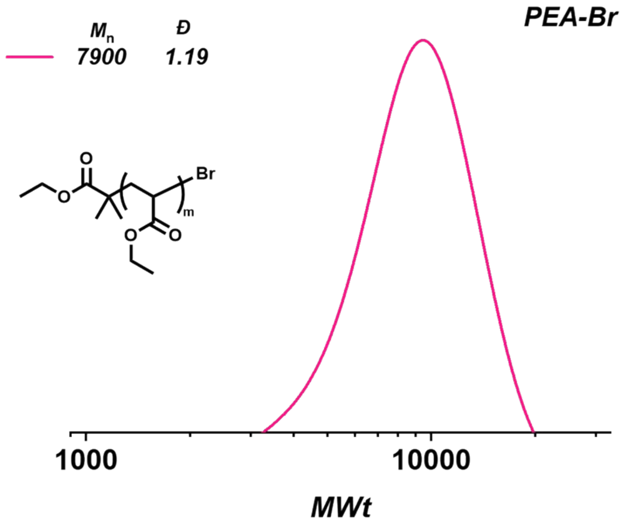


Figure S10. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of EA under both the irradiation of hood light and ultrasound, and the GPC trace.

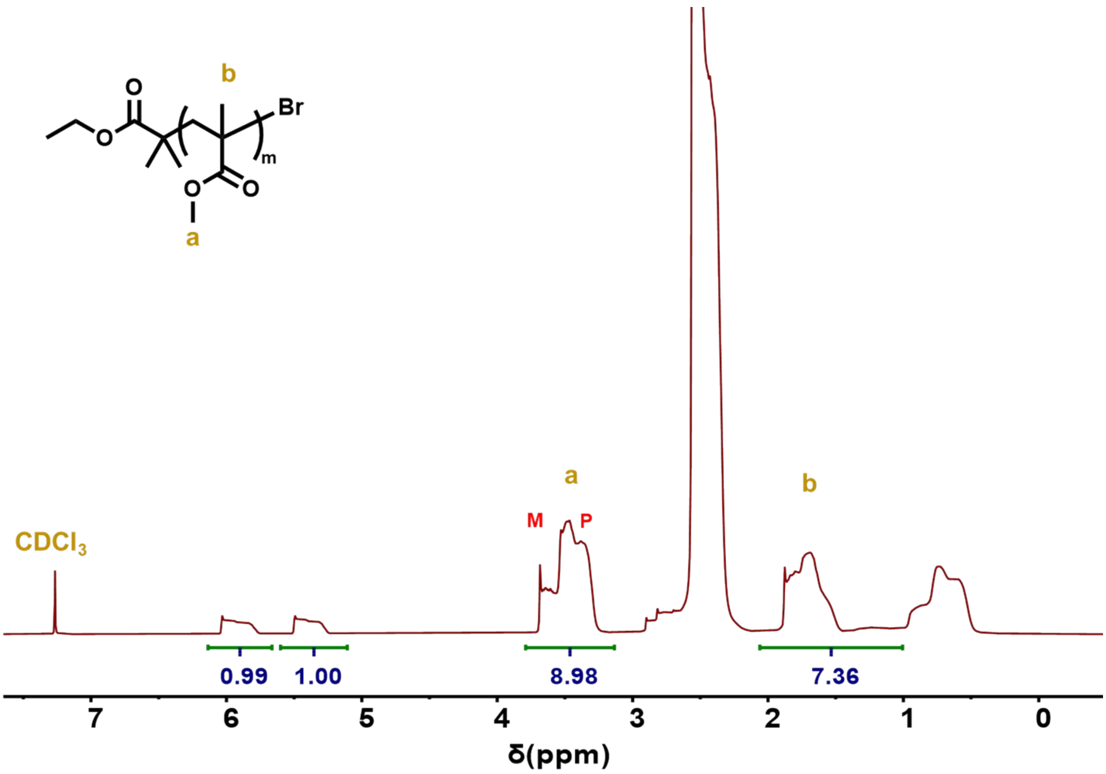
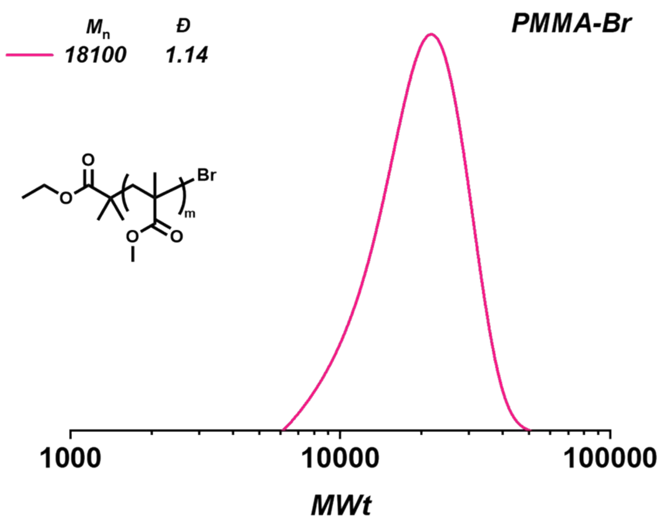
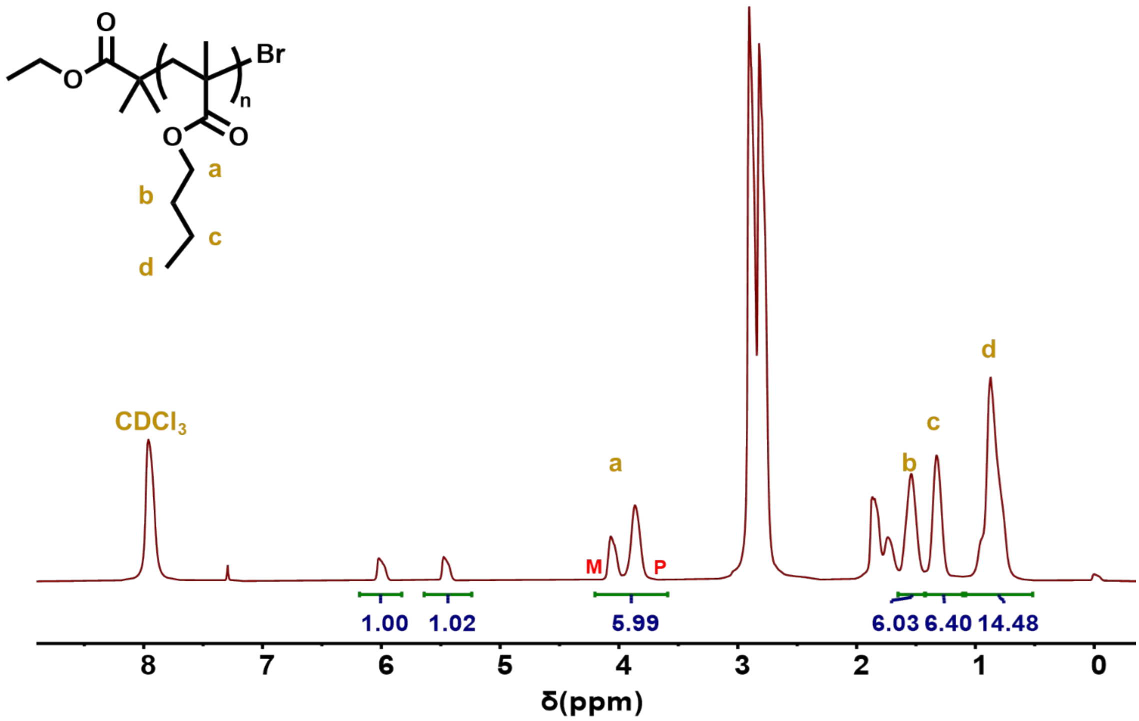


Figure S11. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of



MMA under both the irradiation of hood light and ultrasound, and the GPC trace.



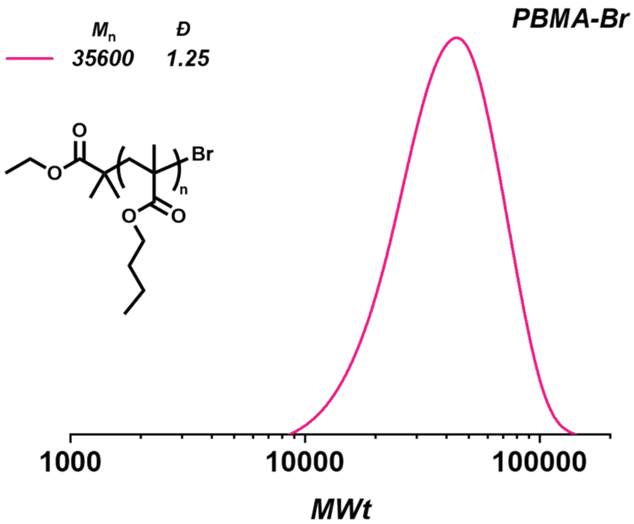
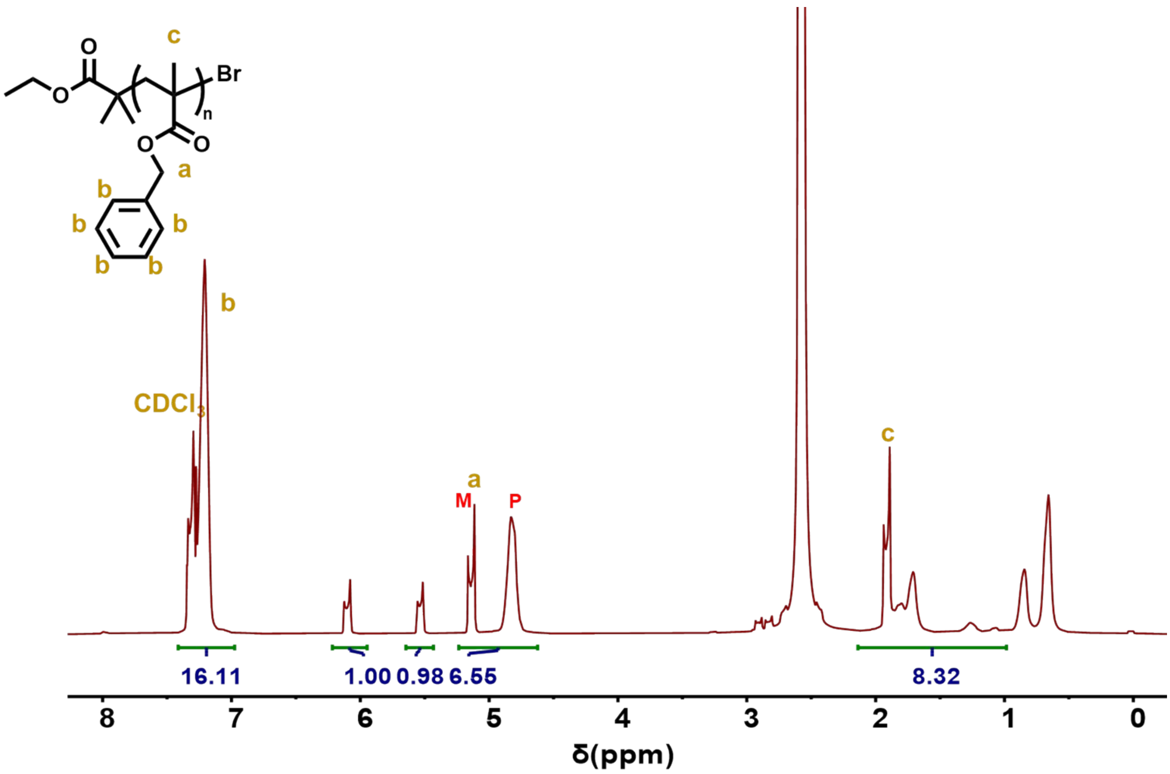


Figure S12. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BMA under both the irradiation of hood light and ultrasound, and the GPC trace.



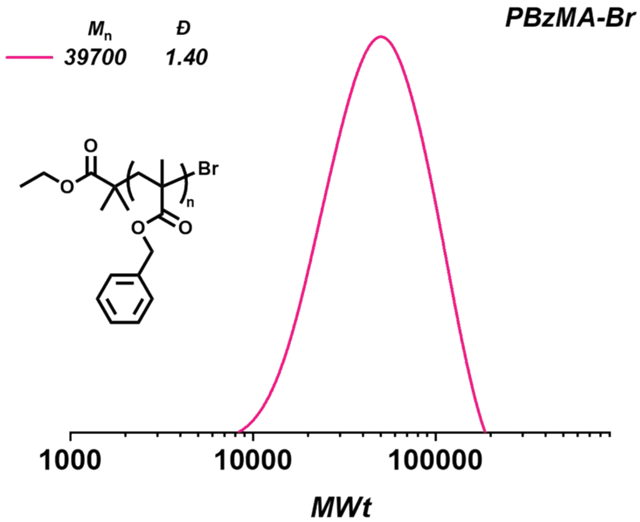
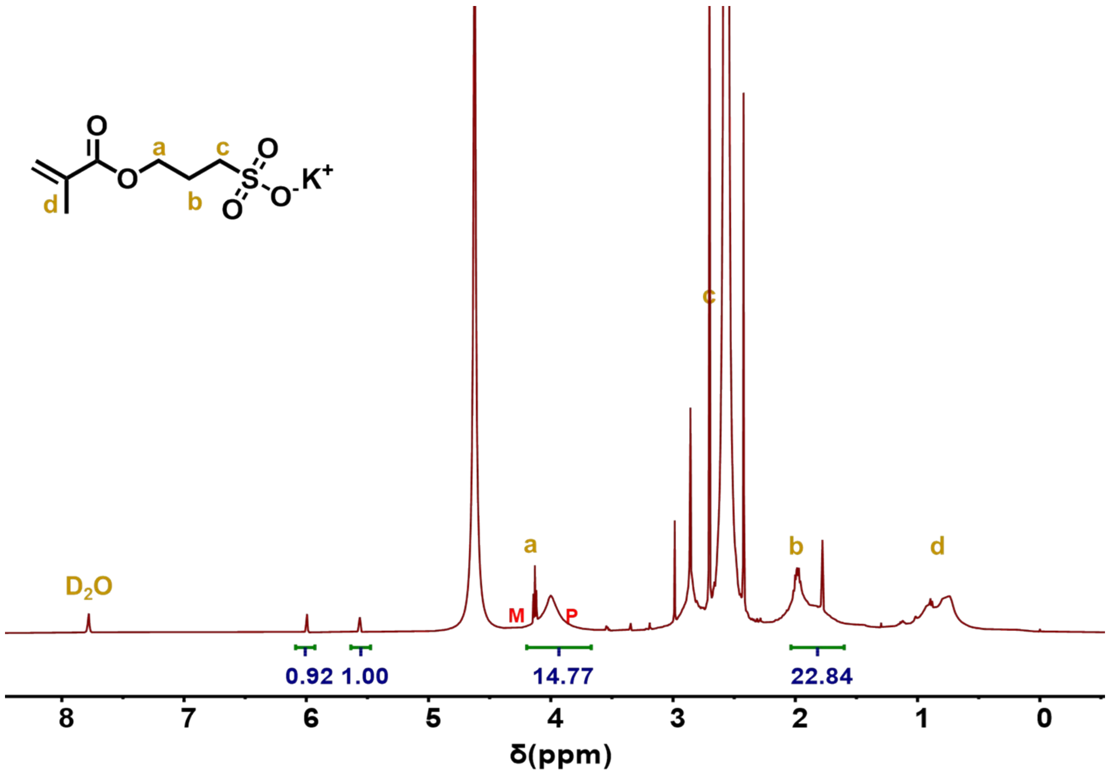


Figure S13. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BzMA under both the irradiation of hood light and ultrasound, and the GPC trace.



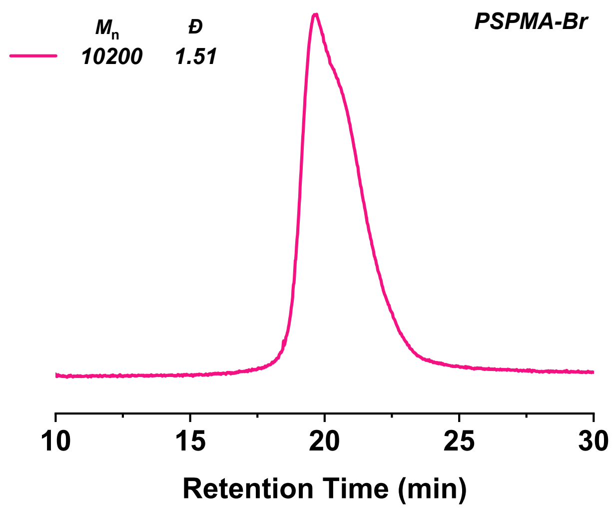


Figure S14. Conversion analysis by [1]H NMR (D_2O) of reaction mixture of SAP-ATRP of SPMA under both the irradiation of hood light and ultrasound, and the GPC trace.

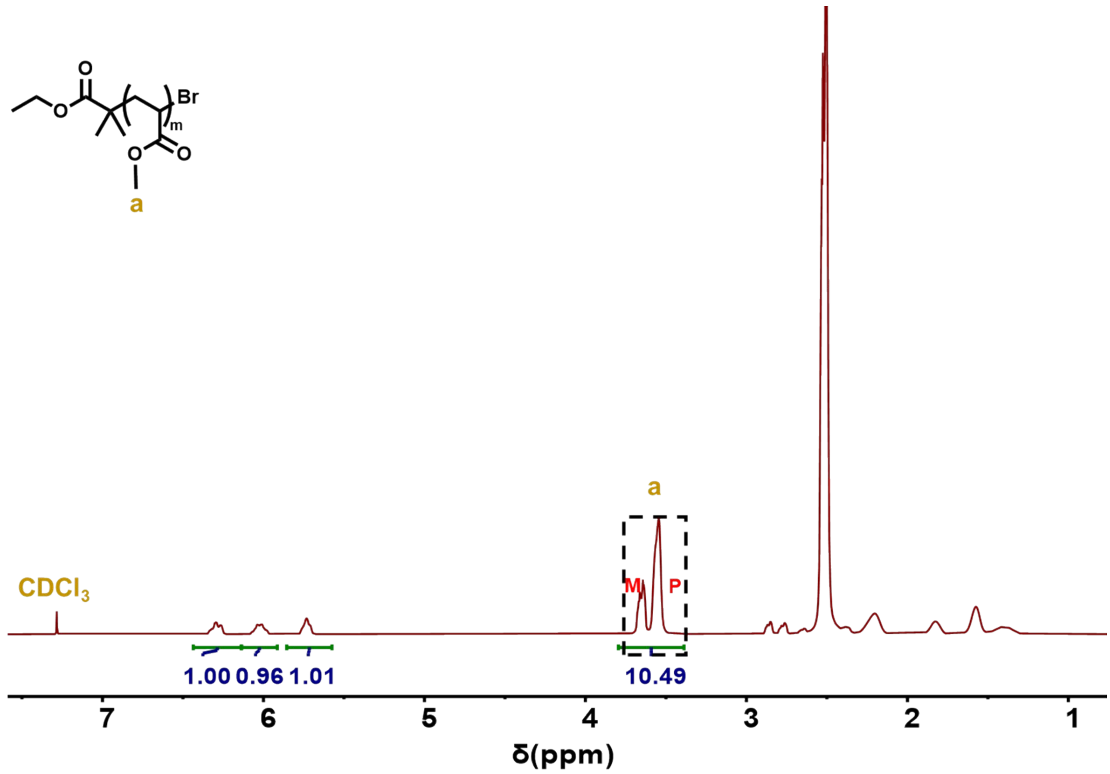


Figure S15. Conversion analysis by [1]H NMR ($CDCl_3$) of PMA-Br.

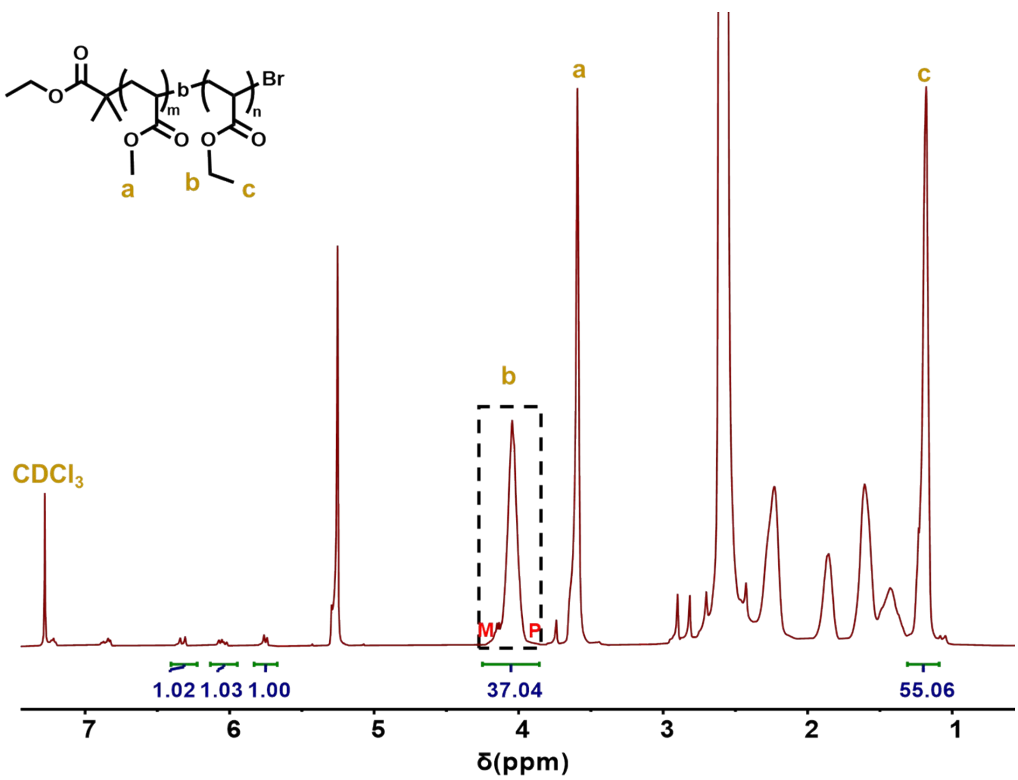


Figure S16. Conversion analysis by ^{1}H NMR ($CDCl_3$) of PMA-*b*-PEA-Br.

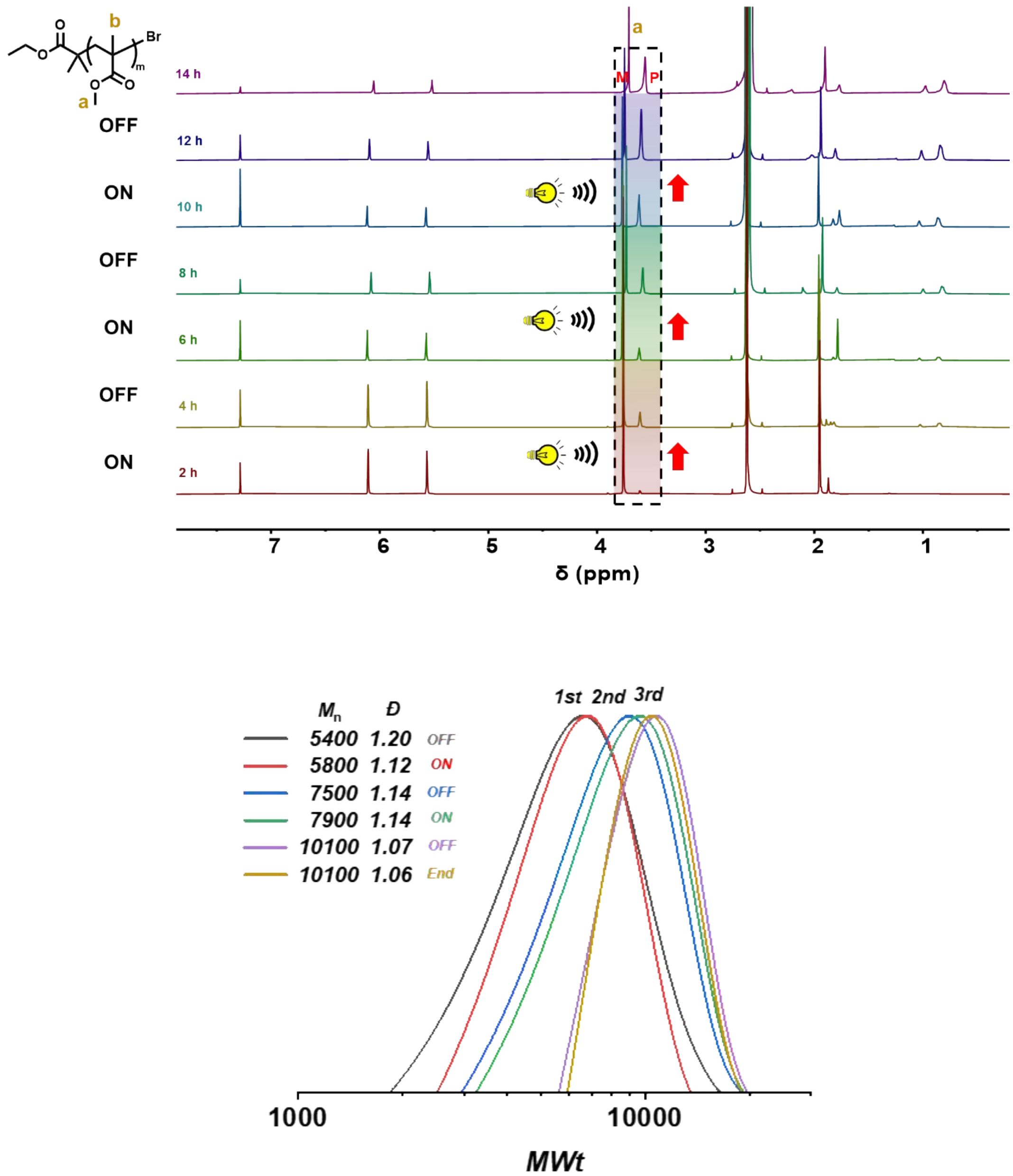


Figure S17. Conversion analysis by ^{1}H NMR ($CDCl_3$) of ***ON-OFF*** ， and the GPC traces.

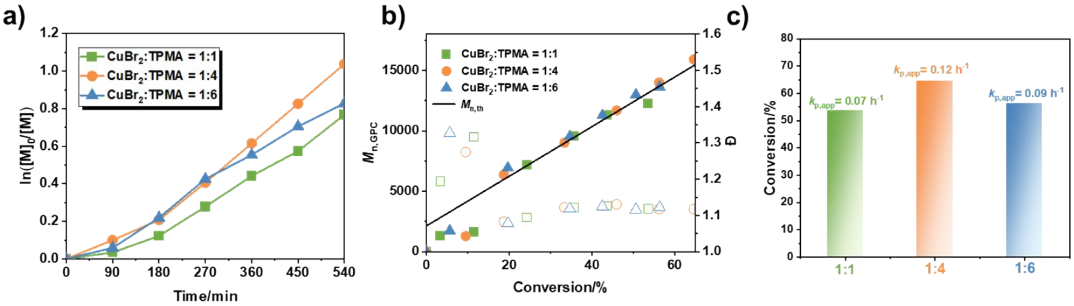


Figure S18. Results for the effect of different contents of TPMA on polymerization. $[BA]_0$: $[EBiB]_0$: $[CuBr_2]_0$: $[TPMA]_0$ = 200:1:0.03:X, 0.45 wt % $Mn_2(CO)_{10}$, in 50% (v/v) DMF. (a) Semi-logarith mic kinetic plots evolution of polymerization under various stimuli. (b) Number-average molecula r weight and molecular weight distribution (Đ). (c) Conversion and apparent rate of the reaction.

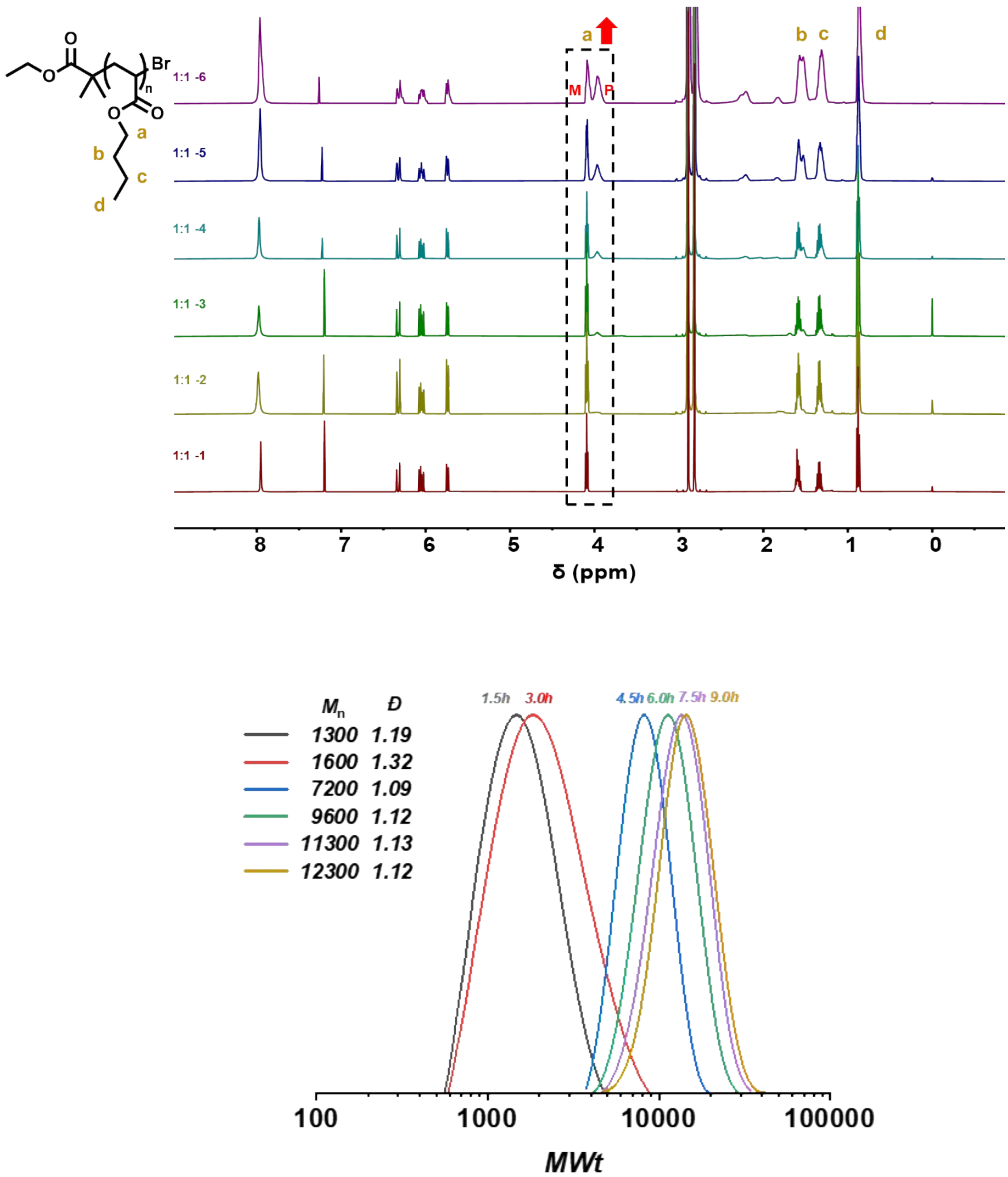


Figure S19. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA, and the GPC traces. $[Cu^{II}]_0$: $[TPMA]_0$ =1:1.

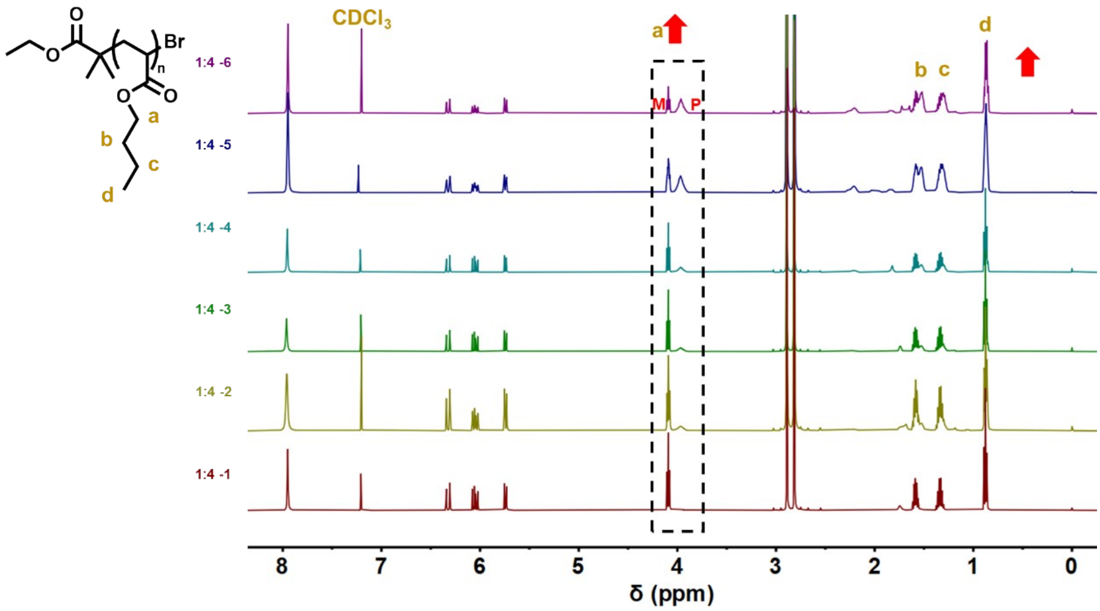
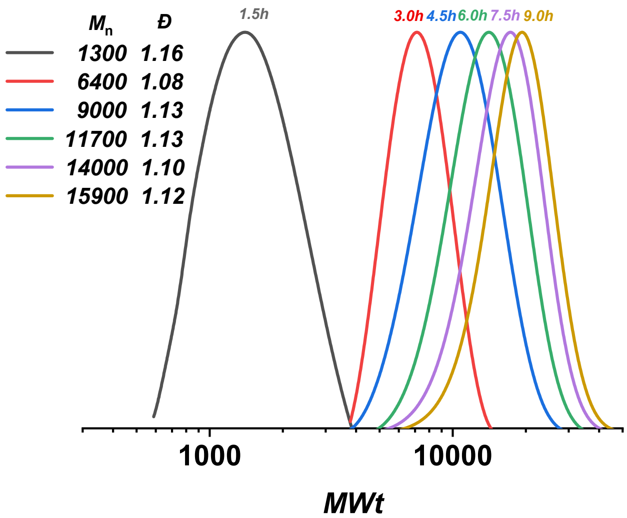
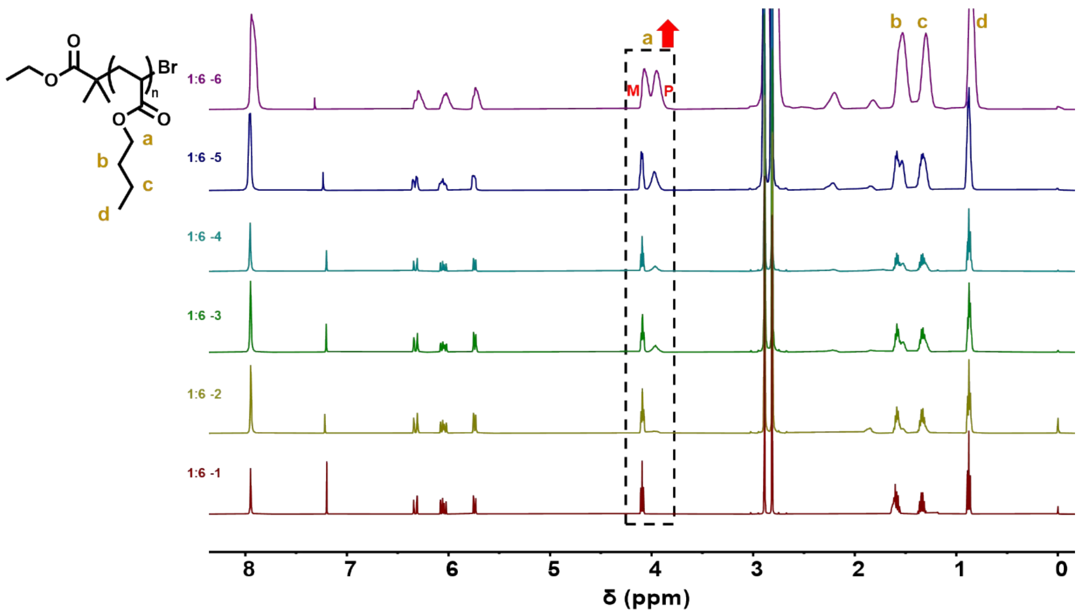


Figure S20. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA,



and the GPC traces. $[Cu^{II}]_0$: $[TPMA]_0$ =1:4.



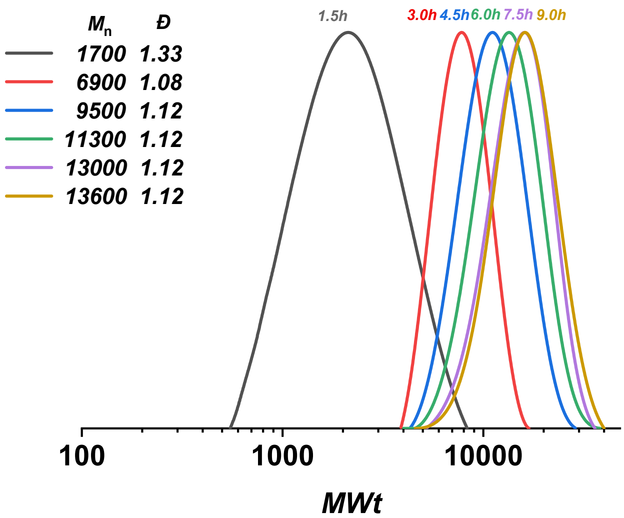
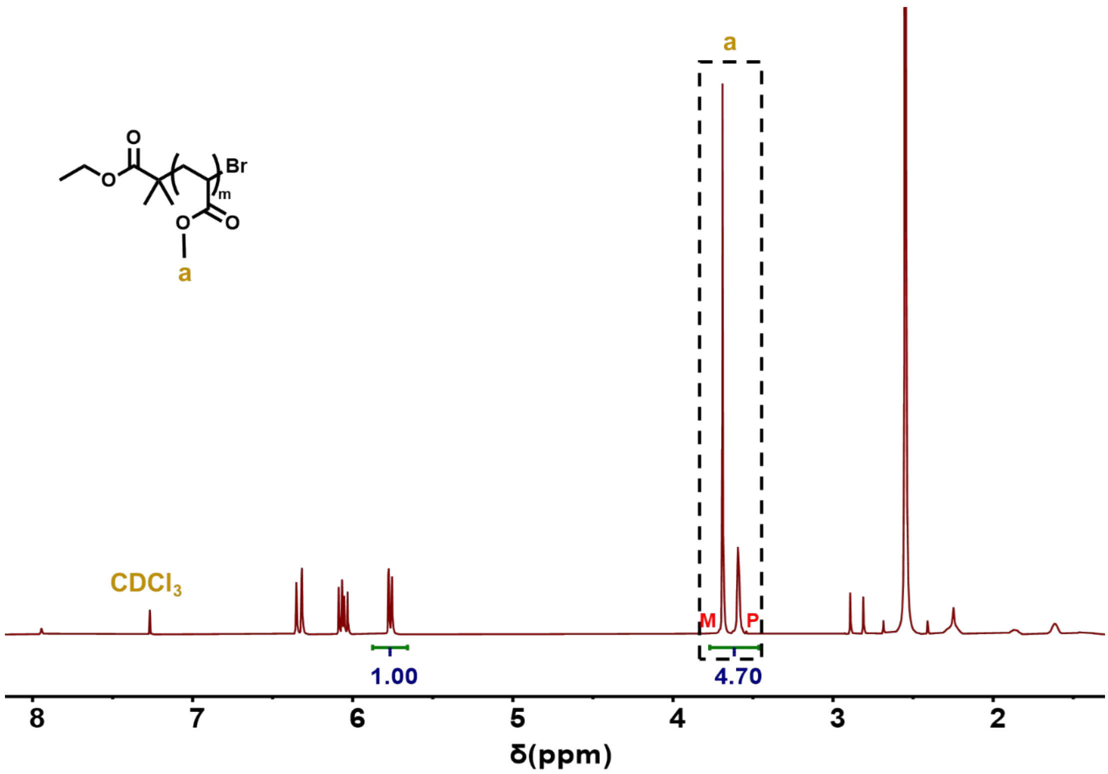


Figure S21. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of BA, and the GPC traces. $[Cu^{II}]_0$: $[TPMA]_0$ =1:6.

Table S1. Results for polymerization of various monomers under concurrent stimuli in different solvents.

Entry[a]	Monomer	*Solvent*	T(h)	Conversion[b]	$M_{n,th}$[c]	$M_{n,GPC}$[d]	$Đ$[d]
1	MA	DMSO	5	50%	8800	8600	1.10
2	MA	DMF	5	50%	8800	8300	1.08
3	MA	Anisole	5	8%	1600	3700	2.73

[a] Reaction conditions:$[MA]_0:[EBiB]_0:[CuBr_2]_0:[TPMA]_0$= 200:1:0.03:0.18 in 50% (v/v) DMSO/DMF/anisole, Magnetic stirring with a rod stirrer.[b] Conversion determined by ^{1}H NMR.[c] Calculated on the basis of conversion (i.e.,$M_{n,th}=M_{EBiB}+[Monomer]_0/[EBiB]_0\times conversion\times M_{monomer}$).[d] Determined by GPC in THF, based on linear PMMA as calibration standard.



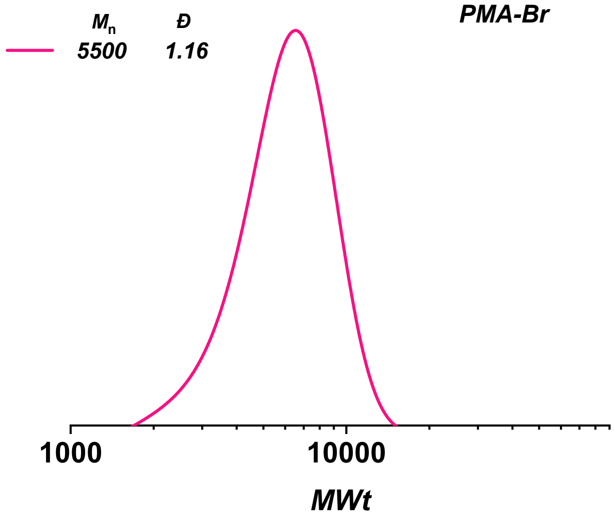
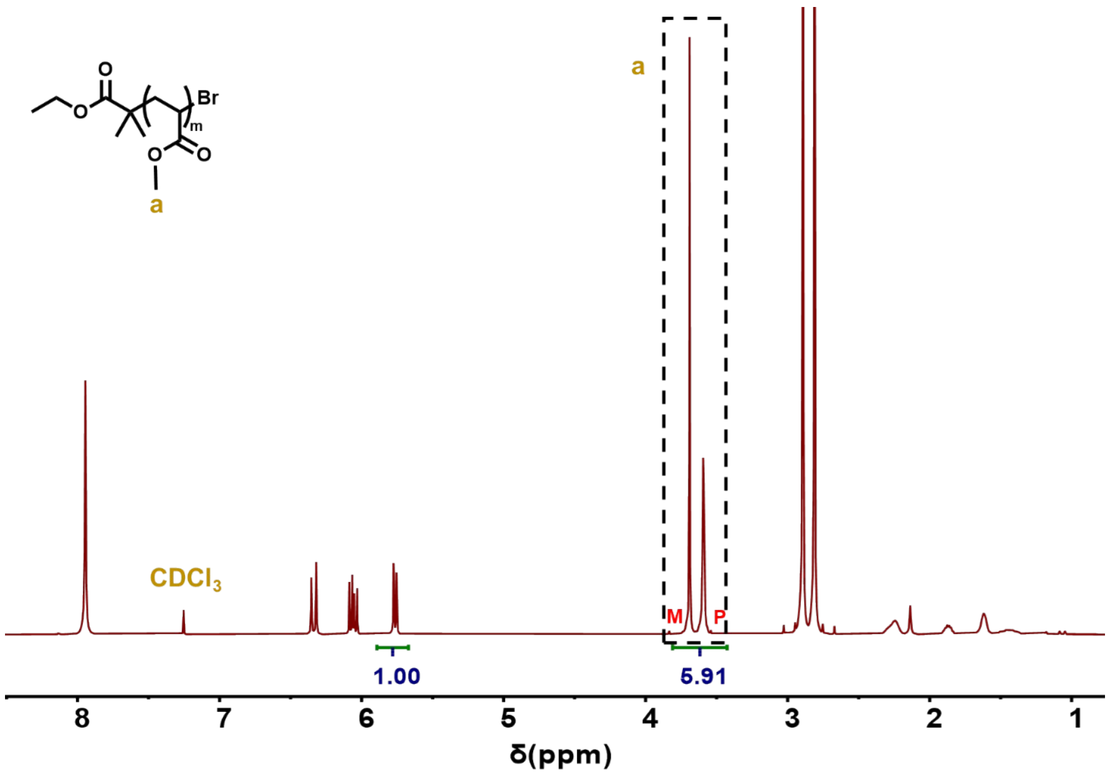


Figure S22. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of MA in 50% v/v DMSO, and the GPC trace.



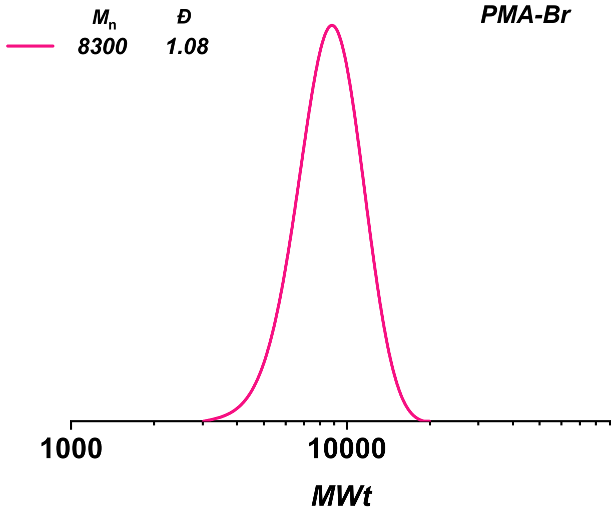


Figure S23. Conversion analysis by [1]H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of MA in 50% v/v DMF, and the GPC trace.

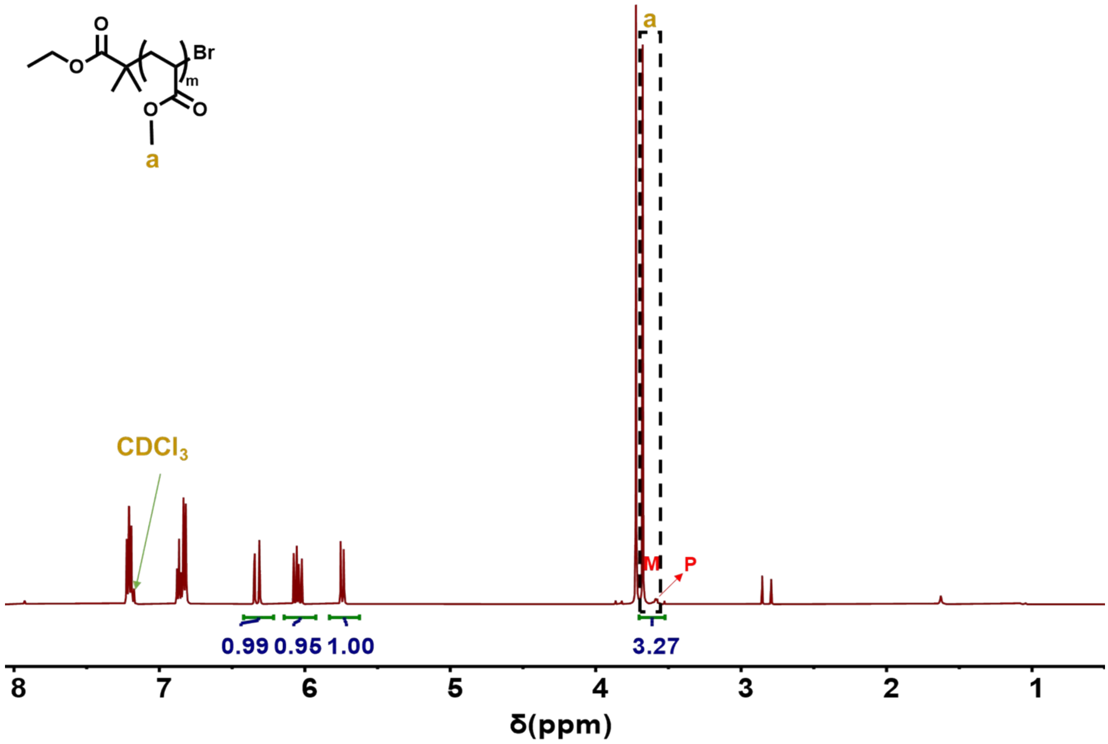
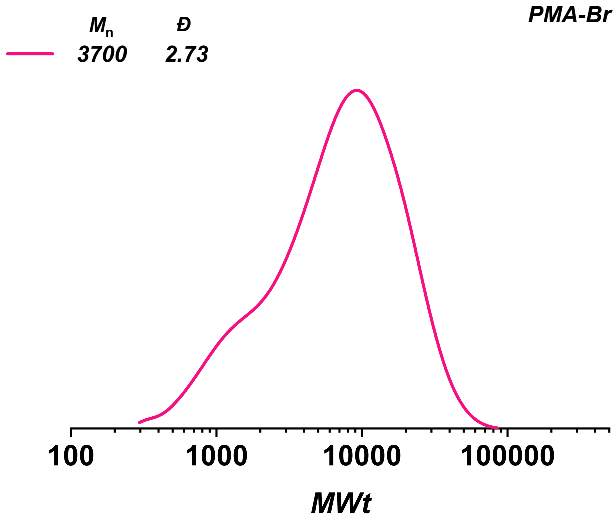


Figure S24. Conversion analysis by ^{1}H NMR ($CDCl_3$) of reaction mixture of SAP-ATRP of MA



in 50% v/v anisole and the GPC trace.

1) Xia, J.; Matyjaszewski, K. Controlled/"Living" Radical Polymerization. Atom Transfer Radical Polymerization Catalyzed by Copper(I) and Picolylamine Complexes. *Macromolecules* **1999**, *32*, 2434-2437.