

Research Article

Qianqian Zhu, Tianchen Song, Jiaxin Zhao, Gang Gao, Yixin Xiang, Jiangang Gao, and Xianrong Shen*

ARGET ATRP of styrene with low catalyst usage in biobased solvent γ -valerolactone

Supplementary material

Table S1 and Table S2
Figure S1

Table S1: Results of ARGET ATRP of St in GVL in the absence of Na_2CO_3

Entry	t (h)	Conv. (%) ^a	$M_{n,\text{GPC}}$ ($\times 10^3$ g/mol) ^b	$M_{n,\text{th}}$ ($\times 10^3$ g/mol) ^b	ΔM_n % ^d	M_w/M_n
1	1	13.0	3.1	2.7	12.9	1.17
2	1.5	21.5	5.7	4.5	21.1	1.37
3	2	29.4	8.8	6.1	30.7	1.58
4	2.5	43.4	11.9	9.1	23.5	1.65
5	3	53.8	14.8	11.2	24.3	1.73

Polymerization conditions: $[\text{St}]_0/[\text{EBPA}]_0/[\text{CuBr}_2]_0/[\text{TPMA}]_0/[\text{AsAc-Na}]_0=200/1/0.1/1.25/1$ in GVL, $T = 110^\circ\text{C}$, $V_{\text{St}} = 3\text{ mL}$, $V_{\text{GVL}} = 1.5\text{ mL}$. (a) Determined gravimetrically, reaction time = 24 h. (b) Determined using GPC against PMMA standard. (c) $M_{n,\text{theo}} = M_{\text{EBPA}} + [\text{St}]_0/[\text{EBPA}]_0 \times \text{conversion} \times M_{\text{St}}$. (d) $\Delta M_n\% = (M_{n,\text{GPC}} - M_{n,\text{th}})/M_{n,\text{GPC}} \times 100\%$.

* Corresponding author: Xianrong Shen, Anhui Laboratory of Clean Catalytic Engineering, School of Chemical and Environmental Engineering, Anhui Polytechnic University, Wuhu, 241000, China, e-mail: shenxr@ahpu.edu.cn

Qianqian Zhu, Tianchen Song, Jiaxin Zhao, Gang Gao, Yixin Xiang, Jiangang Gao: Anhui Laboratory of Clean Catalytic Engineering, School of Chemical and Environmental Engineering, Anhui Polytechnic University, Wuhu, 241000, China

Table S2: Results of ARGET ATRP of St in GVL in the prsence of Na₂CO₃

Entry	<i>t</i> (h)	Conv. (%) ^a	<i>M</i> _{n,GPC} (×10 ³ g/mol) ^b	<i>M</i> _{n,th} (×10 ³ g/mol) ^b	Δ <i>M</i> _n % ^d	<i>M</i> _w / <i>M</i> _n
1	1	19.5	4.8	4.0	17.2	1.50
2	2	32.4	7.5	6.7	10.7	1.38
3	4	47.5	10.8	9.9	8.3	1.29
4	8	57.8	12.8	12.0	6.3	1.27
5	14	72.1	16.1	15.0	6.8	1.28

Polymerization conditions: [St]:[EBPA]:[CuBr₂]:[TPMA]:[AsAc-Na]:[Na₂CO₃] = 200:1:0.001:0.1:1:0.15 in GVL, T = 110 °C, *V*_{St} = 3 mL, *V*_{GVL} = 1.5 mL. (a) Determined gravimetrically, reaction time = 24 h. (b) Determined using GPC against PMMA standard. (c) *M*_{n,theo} = *M*_{EBPA} + [St]₀/[EBPA]₀ × conversion × *M*_{St}. (d) Δ*M*_n% = (*M*_{n,GPC} - *M*_{n,th})/*M*_{n,GPC} × 100%.

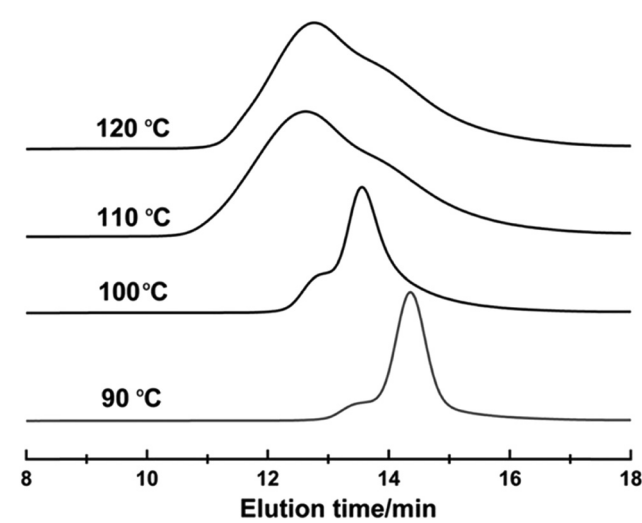


Figure S1: GPC traces for the polymerization of St in GVL at different monomer conversions. Reaction conditions as shown in Table S2.