

## Supporting Information

### **Sonochemistry-assisted Reversible Addition- Fragmentation Transfer Polymerization for Multicolor Room-temperature Phosphorescent Polymers**

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Zhenhua Wang<sup>1,2,3\*</sup>

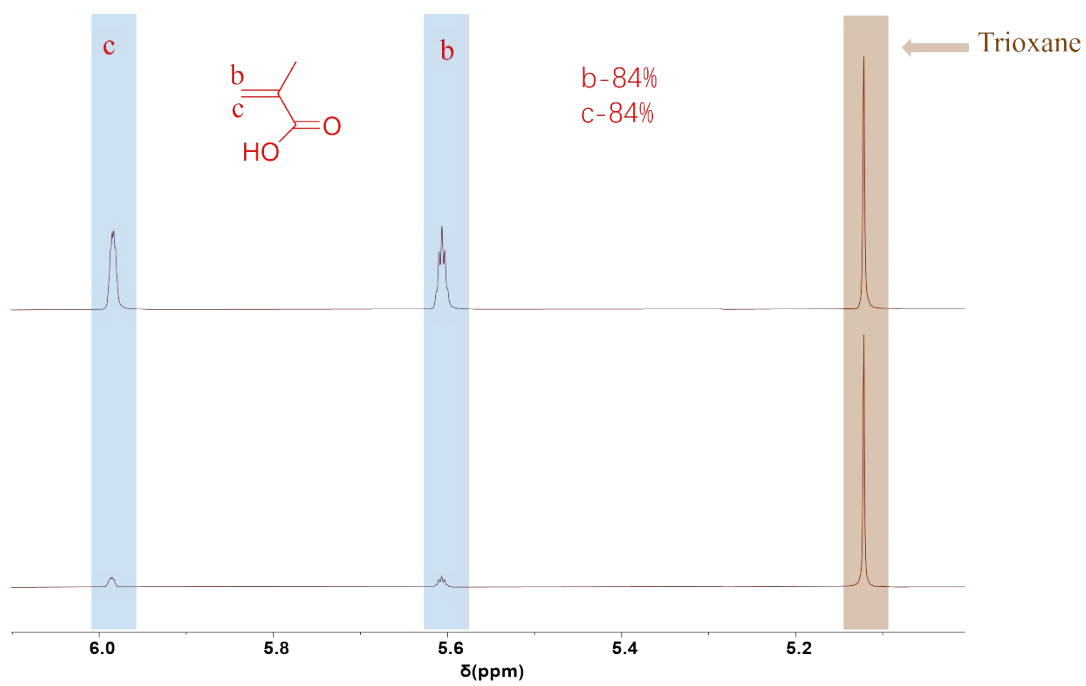
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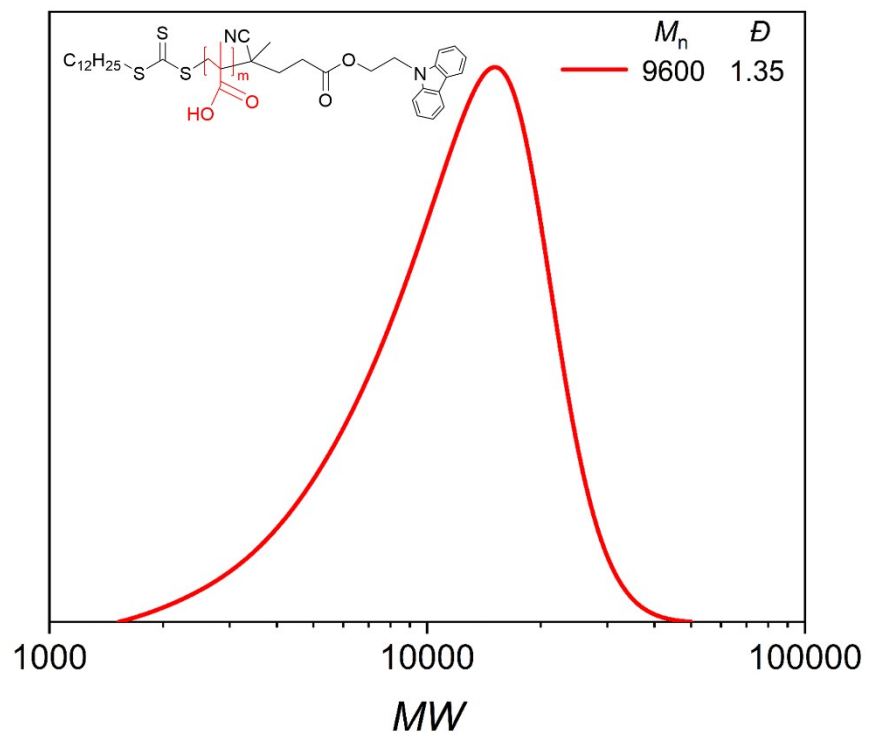
<sup>‡</sup>Equal contribution

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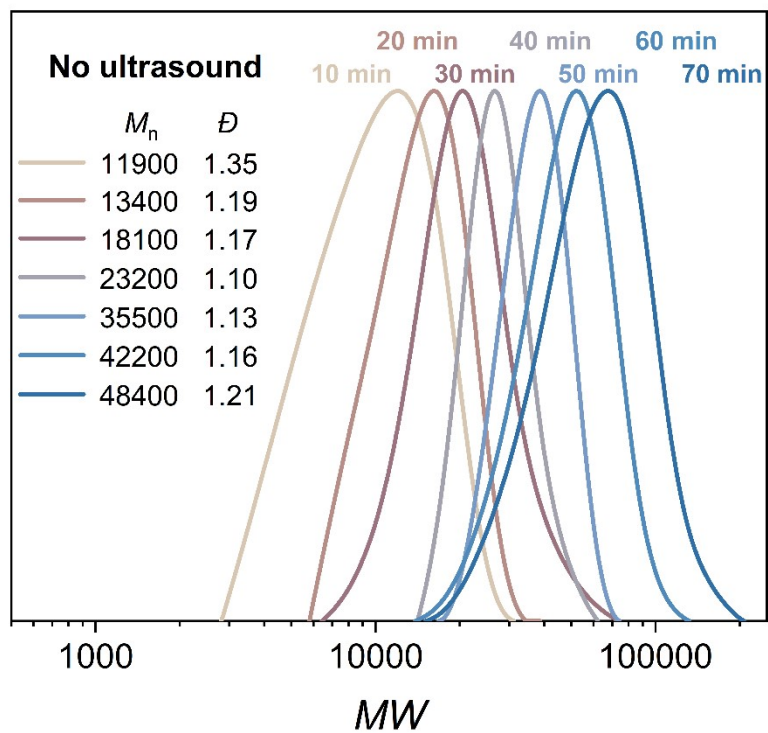
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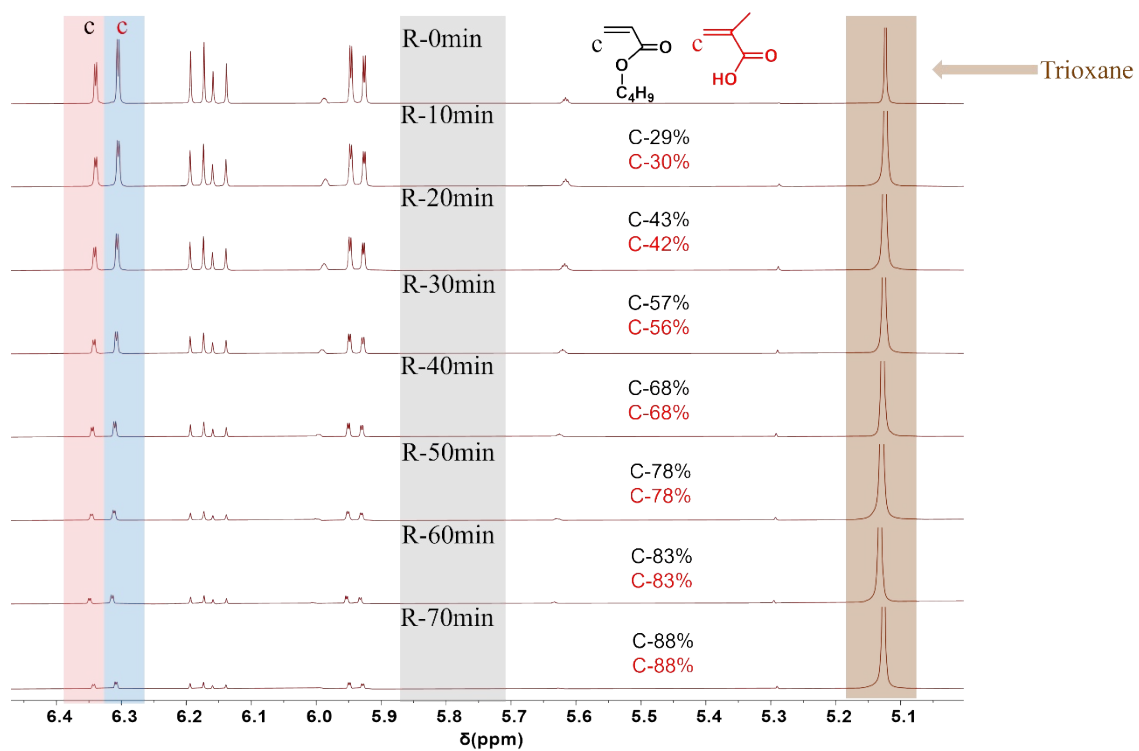
**Figure S1.** Conversion analysis by  $^1\text{H-NMR}$  ( $\text{DMSO-d}_6$ ) of the polymerization of PMAA-CTA.



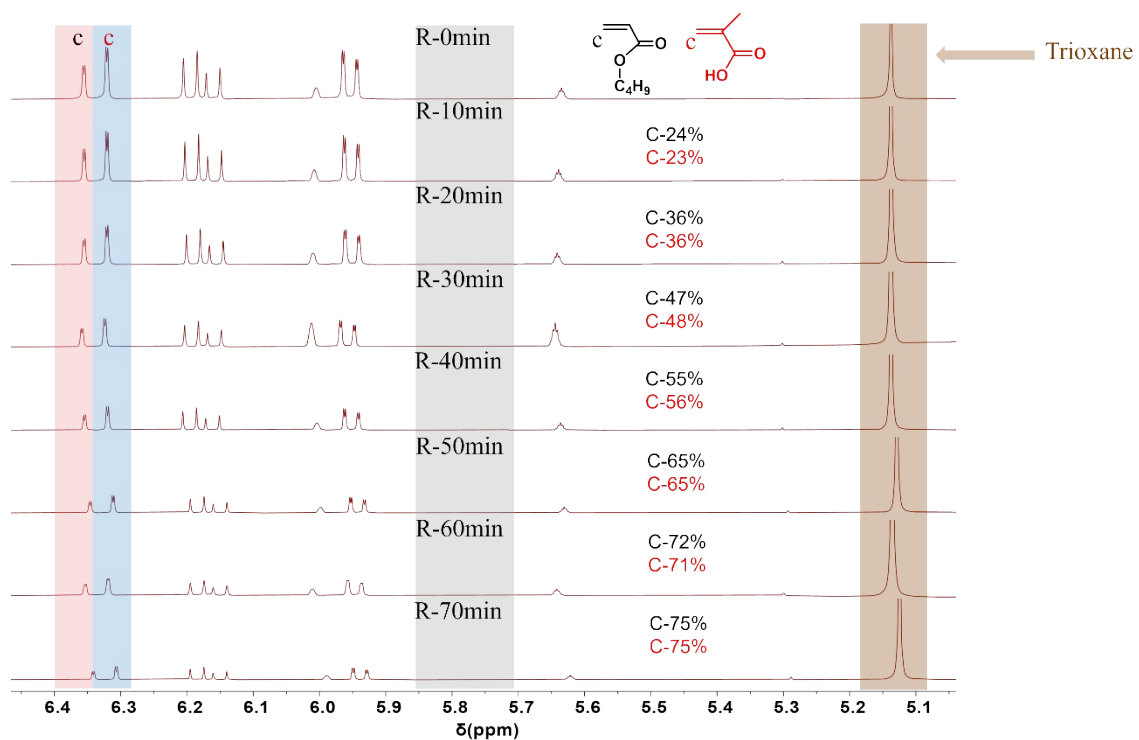
**Figure S2.** The GPC trace of PMAA-CTA.



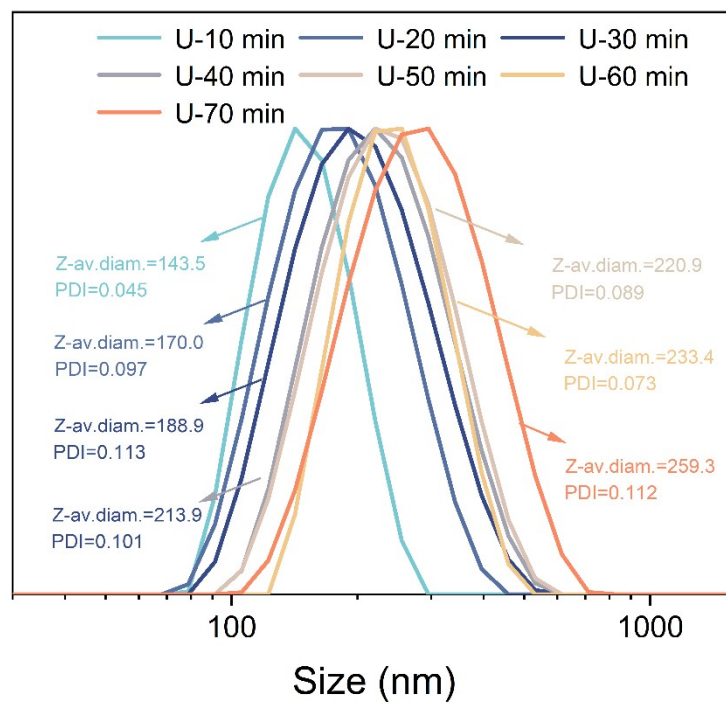
**Figure S3.** The GPC trace of control group.



**Figure S4.** Conversion analysis by  $^1\text{H-NMR}$  ( $\text{DMSO-d}_6$ ) of the polymerization of MAA and BA under ultrasound.

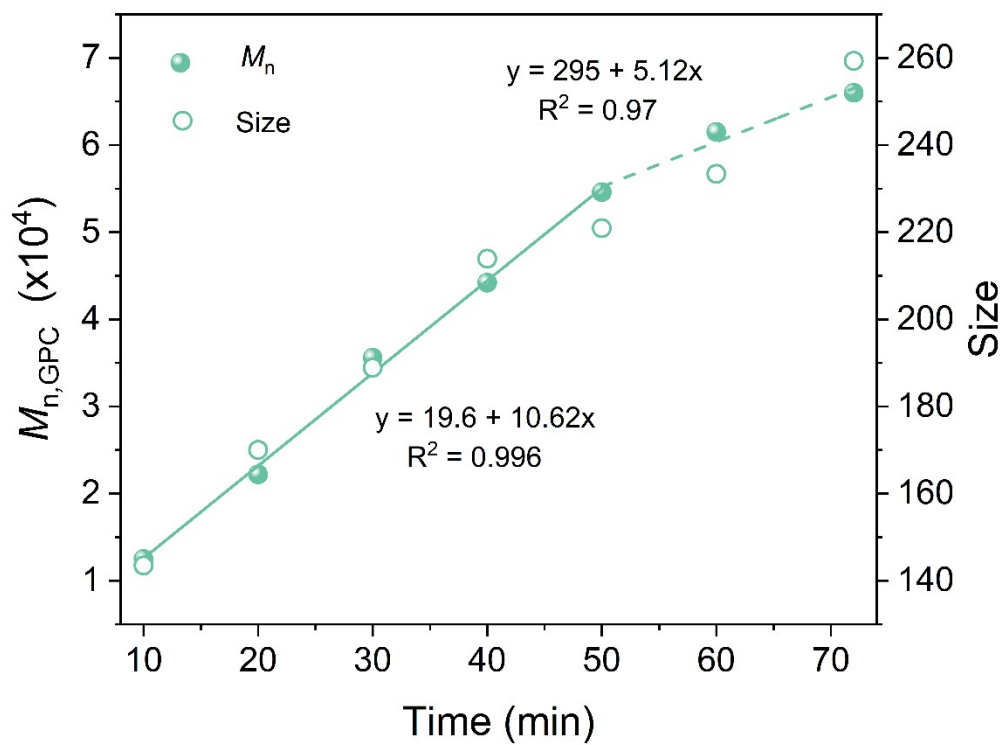


**Figure S5.** Conversion analysis by  $^1\text{H-NMR}$  (DMSO- $d_6$ ) of the polymerization of MAA and BA under control group.

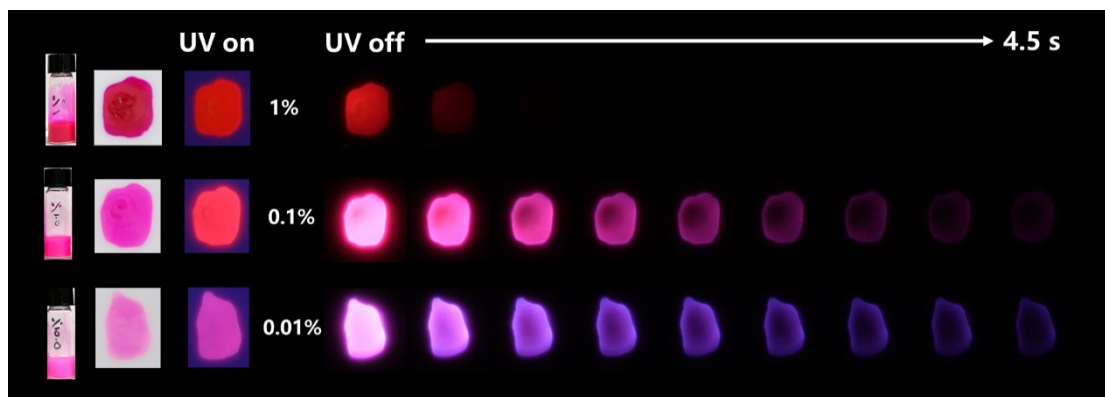


**Figure S6.** Particle size testing at different ultrasound times.

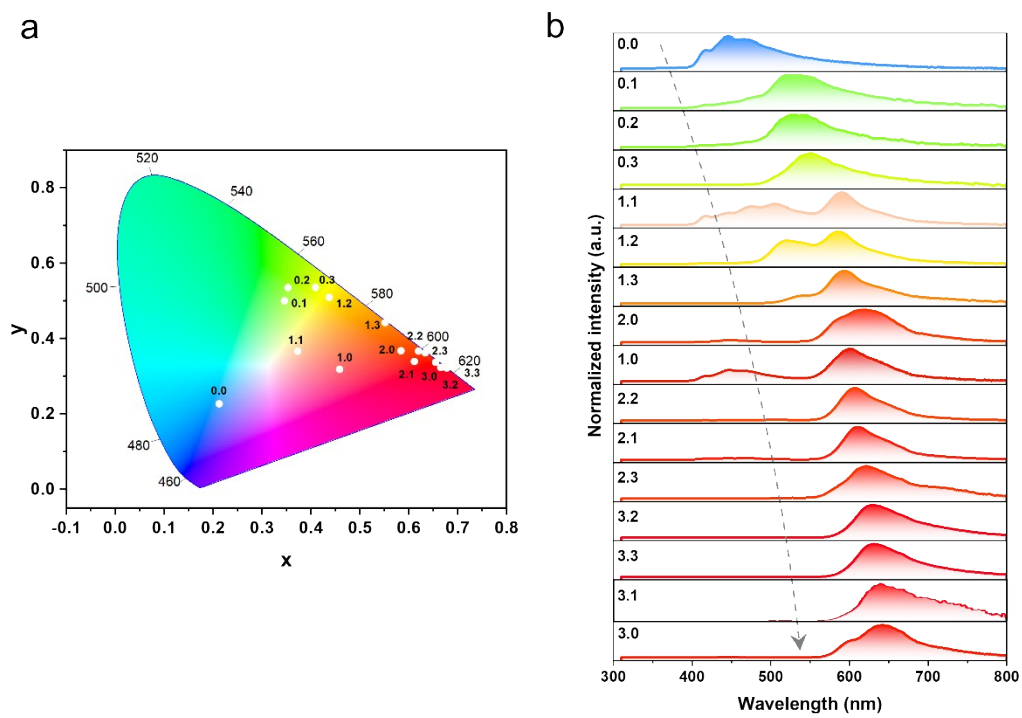




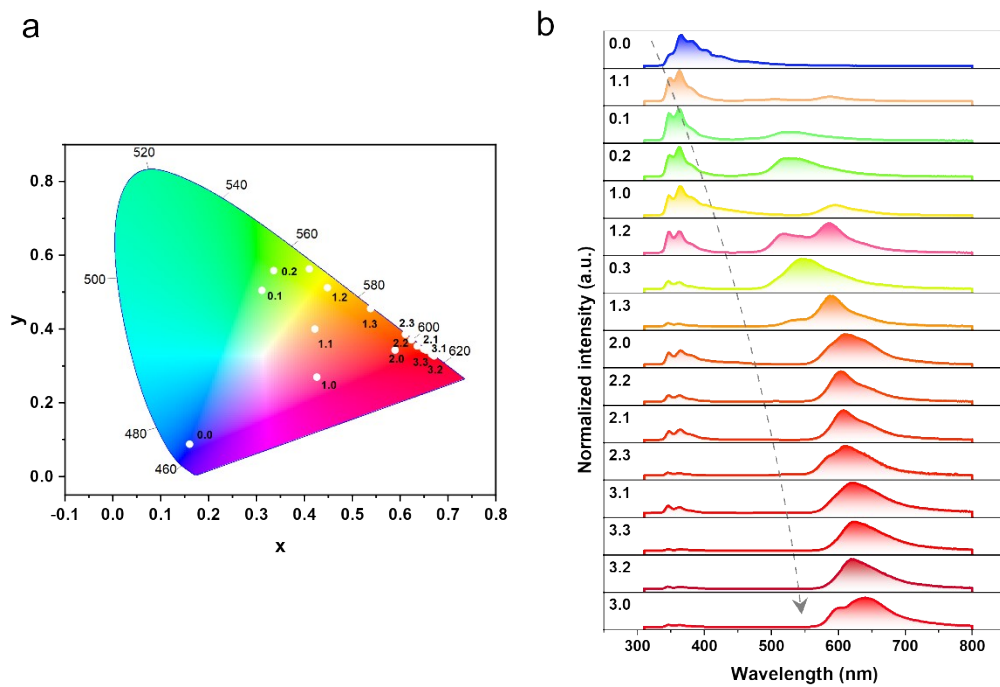
**Figure S7.** Number-average molecular weight and size of ultrasound group.



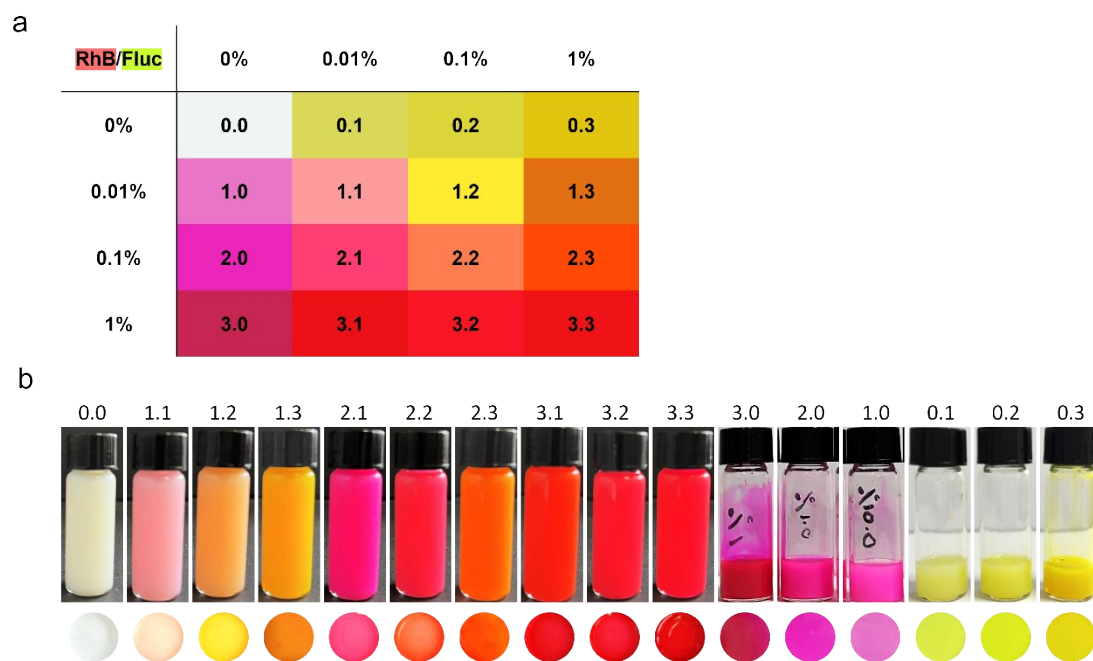
**Figure S8.** Photos of RhB/GCP with different doping concentrations under sunlight, UV irradiation, and UV off.



**Figure S9.** (a) CIE coordinates of afterglow luminescence of RTP materials with different doping ratios, and (b) phosphorescence spectra.

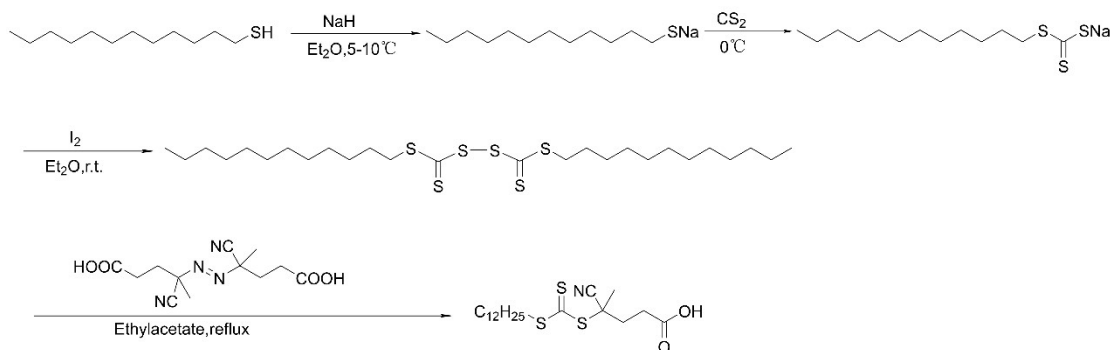


**Figure S10.** (a) CIE coordinates of afterglow luminescence of RTP materials with different doping ratios, and (b) fluorescence spectra.

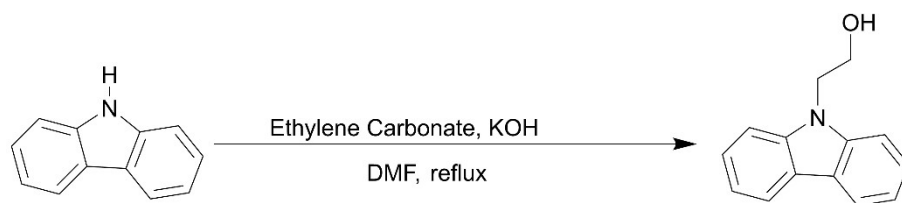


**Figure S11.** (a) RTP polymer color palette with different RhB/Fluc doping ratios. (b) RTP polymer solutions with different RhB/Fluc doping ratios (top) and thin films (bottom).

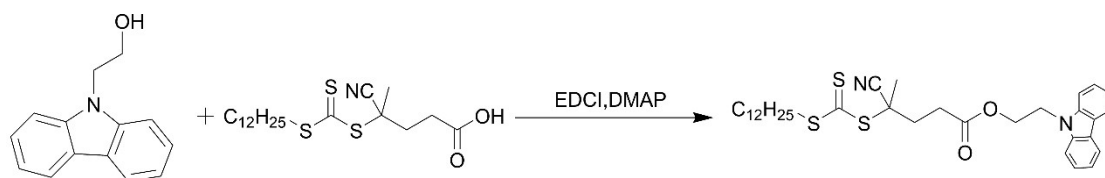
### Scheme S1. Synthesis of CTA



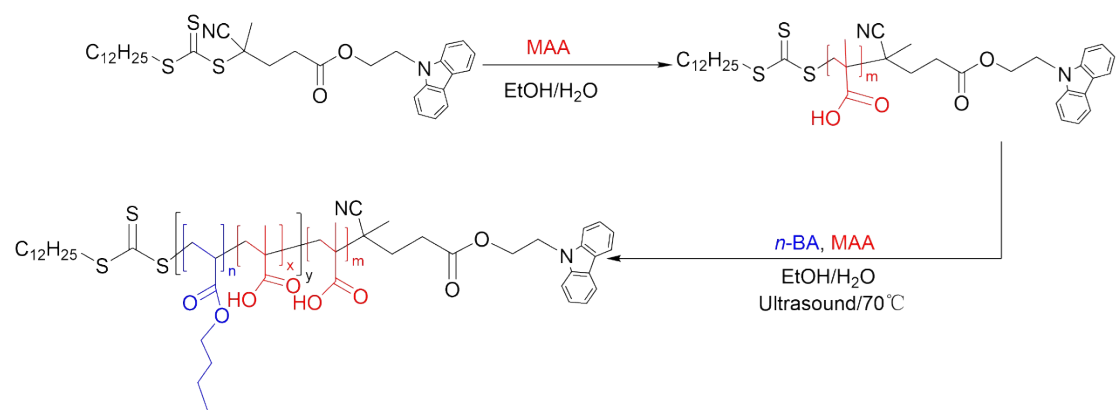
### Scheme S2. Synthesis of Cz-OH

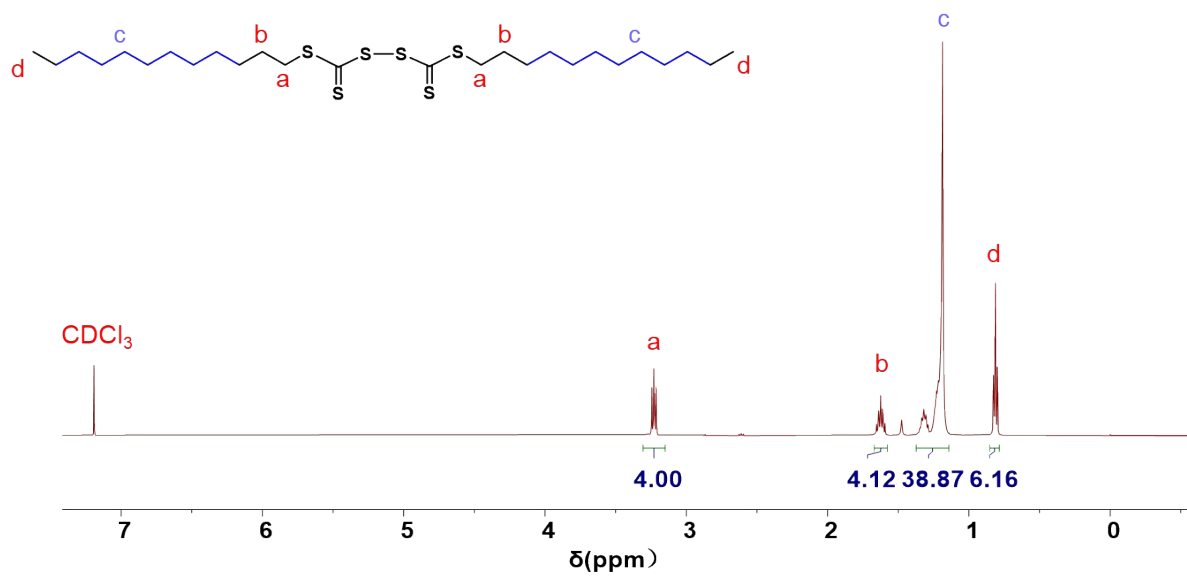


### Scheme S3. Synthesis of RAFT agents



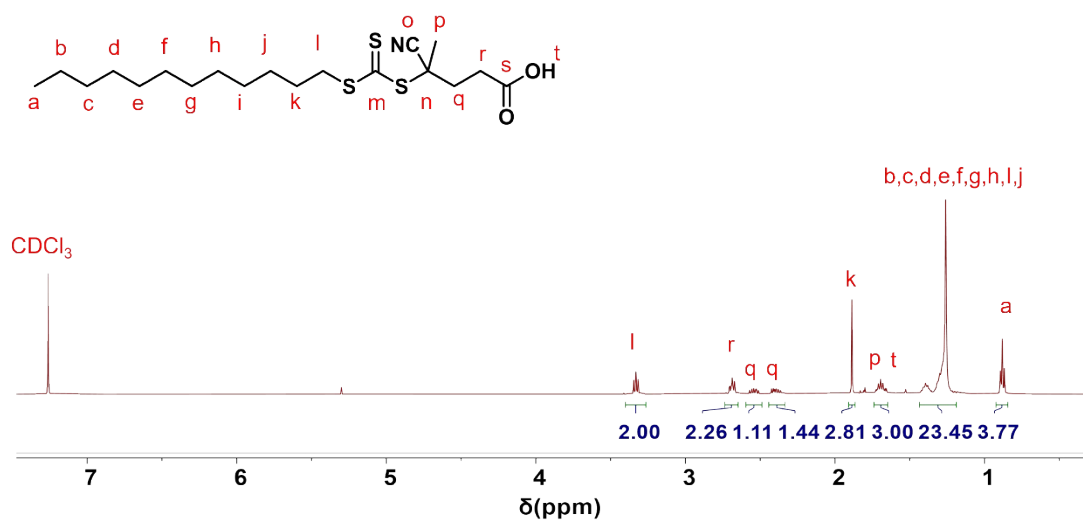
**Scheme S4.** Synthesis of GCP



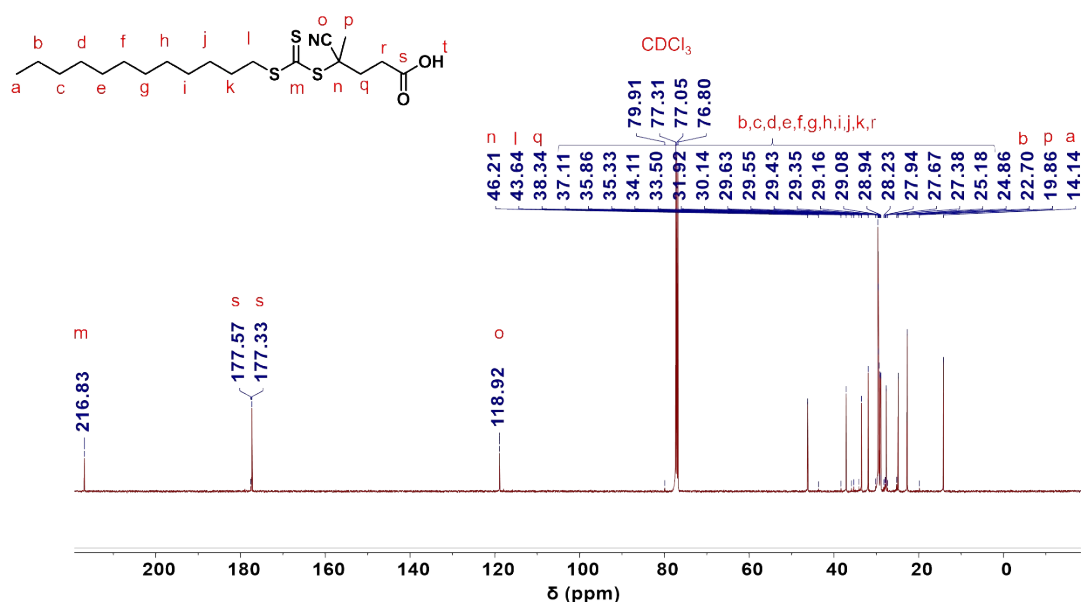


**Figure S12.** <sup>1</sup>H-NMR spectrum of the Bis-(dodecyl thioalkyl thiocarbonyl) disulfide in CDCl<sub>3</sub>.

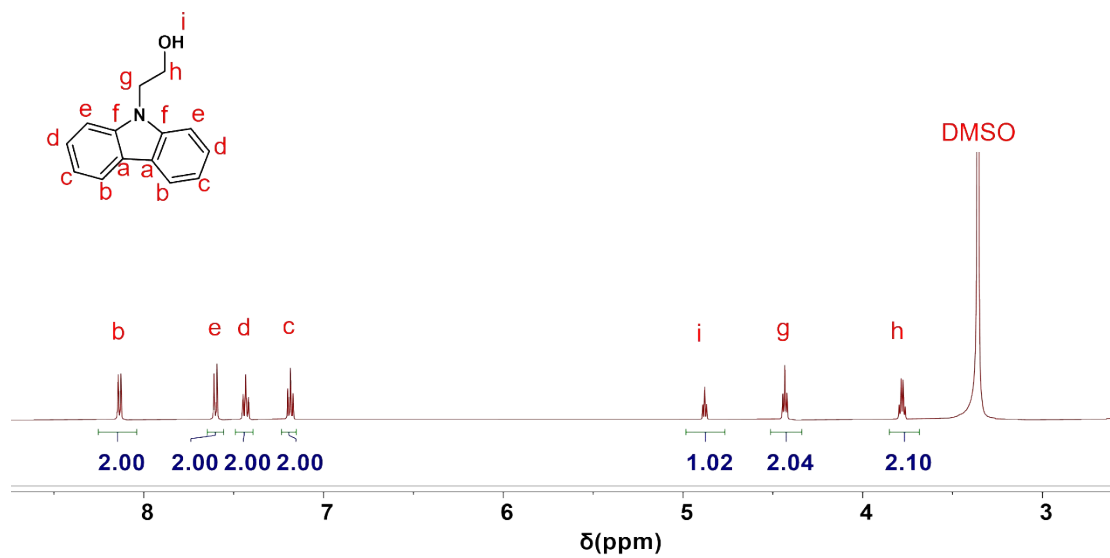




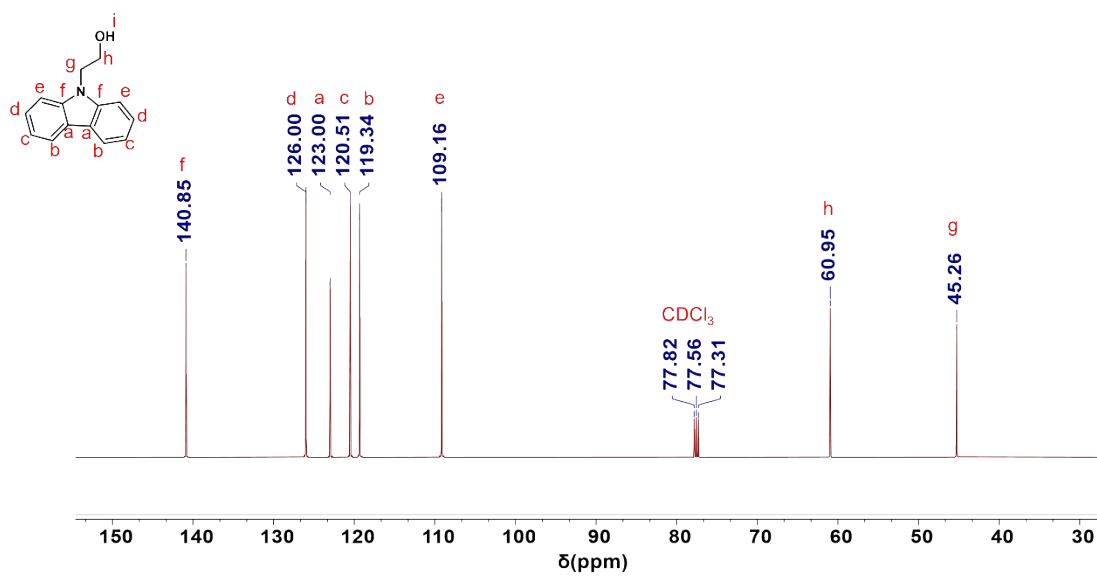
**Figure S13.** <sup>1</sup>H-NMR spectrum of the CTA in CDCl<sub>3</sub>.



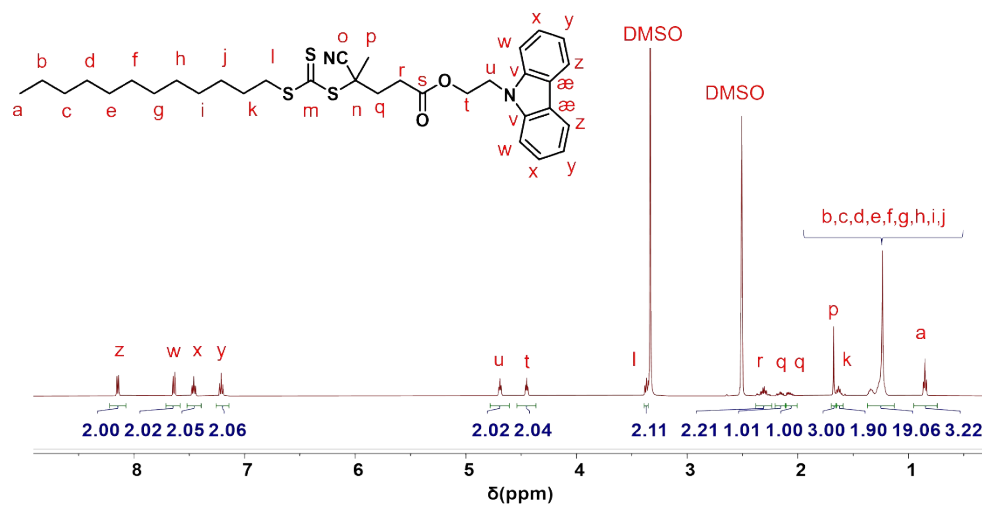
**Figure S14.**  $^{13}\text{C}$ -NMR spectrum of the CTA in  $\text{CDCl}_3$ .



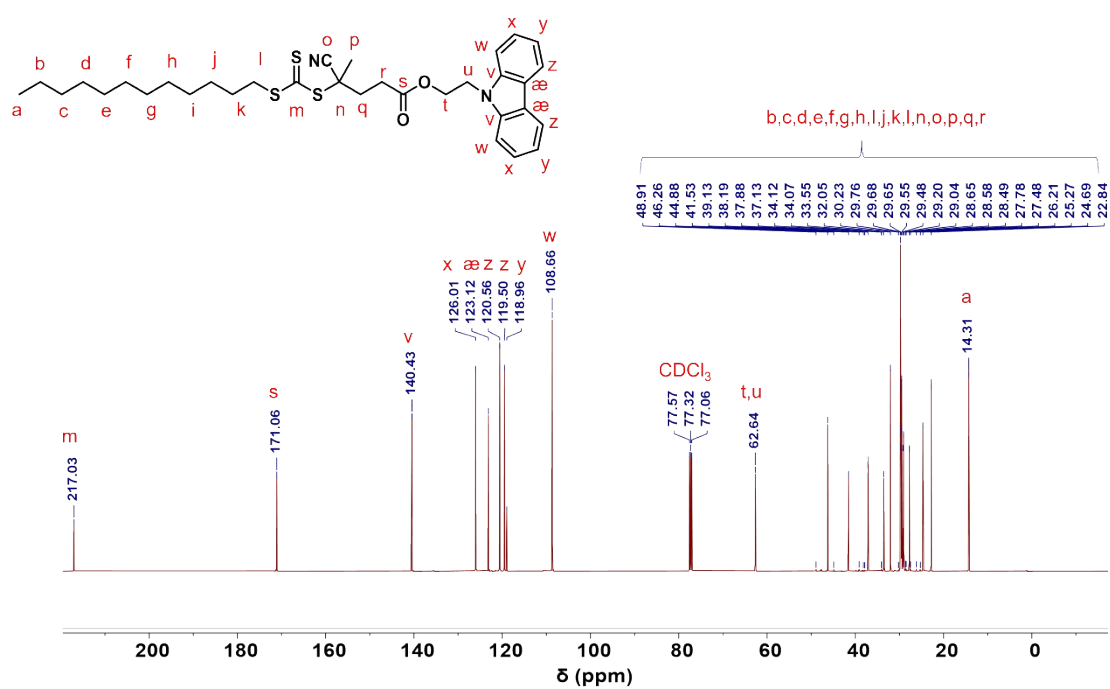
**Figure S15.** <sup>1</sup>H-NMR spectrum of Cz-OH in DMSO.



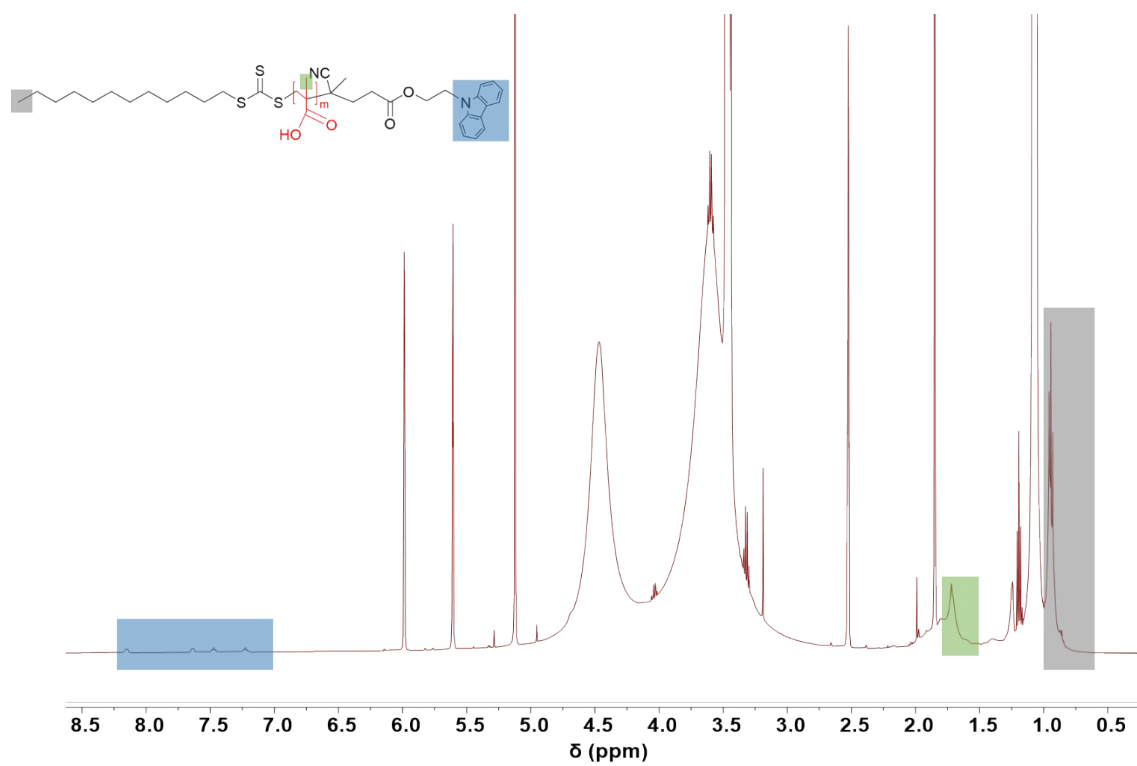
**Figure S16.** <sup>13</sup>C-NMR spectrum of Cz-OH in CDCl<sub>3</sub>.



**Figure S17.** <sup>1</sup>H-NMR spectrum of RAFT agents in DMSO.



**Figure S18.** <sup>13</sup>C-NMR spectrum of RAFT agents in CDCl<sub>3</sub>.



**Figure S19.**  $^1\text{H-NMR}$  spectrum of PMAA-CTA agents in DMSO.