Low-Temperature Chemical Recycling of Polymethacrylates Synthesized by RAFT Polymerization

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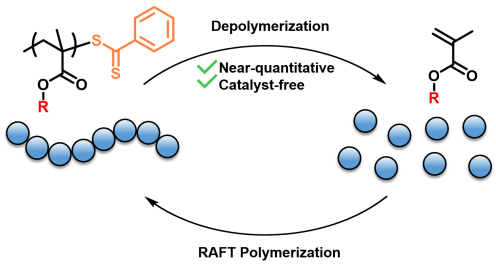
Reversing polymerizations and regenerating the monomer is highly beneficial for both fundamental research and applications, yet this has remained very challenging to achieve.[1] Herein, we report a near-quantitative (up to 92%) and catalyst-free depolymerization of various linear, bulky, cross-linked, functional, and thermally unstable polymethacrylates synthesized by reversible addition–fragmentation chain-transfer (RAFT) polymerization.[2],[3] Key to our approach is to exploit the high end-group fidelity of RAFT polymers to generate chain-end radicals at 120 °C. These radicals trigger a rapid unzipping of both conventional (e.g., poly(methyl methacrylate)) and bulky (e.g., poly(oligo(ethylene glycol) methyl ether methacrylate)) polymers. Importantly, the depolymerization product can be utilized to either reconstruct the linear polymer or create an entirely new insoluble gel that can also be subjected to depolymerization.



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