Poly(2-hydroxyethyl methacrylate): A New Star Polymer

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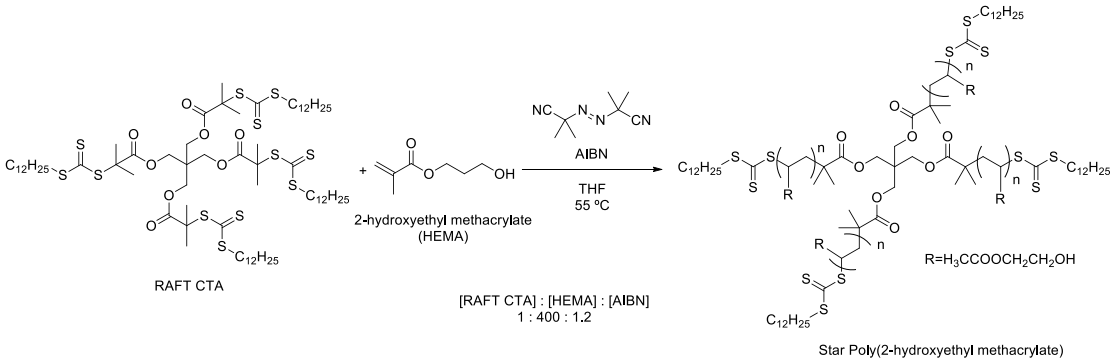
Abstract

Multiarm star polymers are attractive materials due to their unusual bulk and solution properties. They are considered analogues of dendrimers with a wide range of applications, such as drug delivery, membranes, coatings and lithography.[1] The advent of controlled polymerization made possible the existence of this unique class of organic nanoparticles (ONPs).[2] Two major synthetic strategies are usually employed in the preparation of star polymers, the core-first and arm-first approaches. The core-first approach involves a controlled living polymerization using a multiarm initiator core while the arm-first methodology is based in the quenching of living polymers with multifunctional coupling agent or bifunctional vinyl compounds.

Herein, we present the synthesis and characterization of a new star polymer, the multiarm star poly(2-hydroxyethyl methacrylate). The tetra-armed star polymer was prepared by reversible addition fragmentation chain-transfer (RAFT) polymerization using the core-first approach. The RAFT chain-transfer agent (RAFT CTA) pentaerythritol tetrakis[2-(dodecylthiocarbonothioylthio)-2-methylpropionate] was used as multiarm initiator core were 2-hydroxyethyl methacrylate (HEMA) was polymerized using AIBN as radical initiator. Structural characterization was performed by ^{1}H NMR and FTIR. The new polymer is able to uptake large quantities of organic solvents, forming gels. The rheological behavior of these gels was also investigated.



References

1. H. Gao, K. Matyjaszewski. *Progress in Polymer Science* **2009**, *34*, 317-350.

2. T. G. McKenzie, E. H. H. Wong, Q. Fu, S. J. Lam, D. E. Dunstan, G. G. Qiao. *Macromolecules* **2014**, *47*, 7869-7877.