

Sub-micron size hairy latex particles by dispersion polymerization using hydrophilic macro-RAFT agents.

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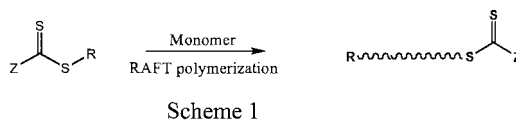
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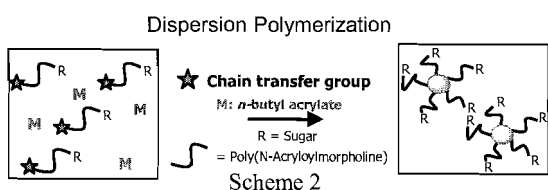
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In dispersion polymerization, chain transfer reactions are advantageously used for stabilization purposes during latex syntheses. Transfer along a polymeric chain, for example poly(vinylpyrrolidone), leads to the formation of a graft copolymer that is adsorbed onto the forming particles conferring a steric stabilization to the final produced latex. The transfer reaction can also be located at one polymer chain end and induce the formation of a stabilizing block copolymer.[1]

The development of Controlled Radical Polymerization techniques allows the production of polymers exhibiting well-defined chain-ends with an additional control over the chain length. One of the most versatile approaches, the Reversible Addition-Fragmentation chain Transfer (RAFT) polymerization[2] is mediated by thiocarbonyl thio compounds (RAFT agents of the general formula Z-C(=S)-SR) and leads to chains carrying R and Z-C(=S)-S groups - coming from the RAFT agent- as α - and ω -ends, respectively (Scheme 1). The choice of appropriate RAFT agents makes possible to design the α -end and to take advantage of the ω -end (incorporating the Z group) according to a targeted application.



As such, RAFT synthesized chains - carrying a very efficient ω -end chain transfer dithioester function - appeared to us as very interesting candidates for further use in dispersion polymerization. As a result of the additional possibility of tuning the α -end, this strategy could consist in an efficient new way of designing latex surfaces.



Focusing on bio-applications, we first proposed a strategy for the synthesis of bio-related functional RAFT agents which relies on a RAFT agent precursor bearing an activated ester in the R group. As the latter reacts with nucleophiles in a one step reaction, a range of amino-based molecules of interest were successfully introduced as

R groups (sugars, biotin...).[3a] Hydrophilic polymer chains was then synthesized by RAFT polymerization mediated by these RAFT agents in organic solvent and further used in dispersion polymerization to produce poly(*n*-butyl acrylate) latex particles. The characterization of the produced latex evidenced the successful introduction of the functional hair and allowed us to incorporate various functionality onto the latex surface (Scheme 2).[3b]

References

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