SYNTHESIS OF HIGH MOLECULAR WEIGHT LIQUID MOLECULAR BRUSHES AND THEIR BULK PROPERTIES

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ABSTRACT

In this work, the synthesis of high molecular weight liquid molecular brushes, based on alternating copolymers of styrene (S) or *n*-butyl vinyl ether (*n*BVE) and maleic anhydride (MAnh), is reported. The conditions under which the liquid behaviour at room temperature is exhibited are also investigated. The alternating copolymer backbones are synthesized via both the conventional free radical polymerization as well as the "living" RAFT technique, followed by modification of the maleic anhydride ring, via the nucleophilic substitution reaction with primary amines, to form the brushes. Various primary amines are used, including *n*-butyl amine, oleyl amine and polyethylene glycol mono-methyl ether amine (PEG_{12}-NH_2). Poly (*n*BVE-*alt*-MAnh) copolymers, functionalised with PEG_{12}-NH_2 side chains, turned out to be liquids at room temperature whilst the phase state of the corresponding S/MAnh-based alternating copolymer brushes displayed a gel-like behaviour at molecular weights in excess of 100 kg·mol^{-1}. The DSC crystallization and melting temperatures of these brush systems, however, were the same, suggesting that the crystallization and melting was that of the PEG_{12} side chain. Further investigations into this phenomenon are currently underway.