

Well Defined Thermoresponsive Block Copolymers Based on 2-Dimethylamino) ethyl methacrylate, Poly(ethylene glycol) methacrylate and *n*-Butyl methacrylate

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Seven well defined copolymers based on the hydrophobic monomer *n*-butyl methacrylate (BuMA), the ionisable hydrophilic monomer 2-(dimethylamino)ethyl methacrylate (DMAEMA) and the non-ionic hydrophilic monomer poly(ethylene glycol) methacrylate (PEGMA) were synthesised by Group Transfer Polymerisation (GTP). Synthesis took place in tetrahydrofuran using tetrabutylammonium bibenzoate as a catalyst and 1-methoxy-1-(trimethylsiloxy)-2-methyl-propene as the initiator. Six of the copolymers were terpolymers of different architectures and compositions. Specifically four of the terpolymers had the same composition but different architectures: three triblock copolymers (ABC, ACB and BAC) and a statistical terpolymer, while two more ABC copolymers with varying DMAEMA – BuMA content as well as a DMAEMA-PEGMA diblock copolymer were also prepared. The polymers and their precursors were characterised by gel permeation chromatography and ¹H NMR spectroscopy to confirm a successful GTP synthesis. Their aqueous solution characterisation by turbidimetry, hydrogen ion titration, light scattering and rheometry revealed how the polymer's architecture and composition affect the polymer's properties. The p*K* was only affected by the polymer's hydrophobicity while the size of the micelles was affected by both the composition and the architecture of the copolymers. The rheological and thermoresponsive behaviour of the copolymers were also affected by both the composition and the architecture of the polymers with ABC triblock copolymer with the highest BuMA content forming a physical gel at 57 °C.