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SYNTHESIS OF NOVEL SHELL CROSSLINKED MICELLES

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We are investigating the feasibility of preparing shell cross-linked (SCL) micelles[1] in the absence of a small molecule cross-linker. The present work involves complexation of a micelle-forming anionic ABC triblock copolymer with a primary amine-based diblock copolymer cross-linker. The ABC triblock copolymer comprised a poly(ethylene oxide) 'A' block, a succinic anhydride-esterified poly(2-hydroxypropyl methacrylate)-based anionic 'B' block and a pH-responsive poly(2-(diisopropylamino)ethyl methacrylate) 'C' block. Two AB diblock copolymer cross-linkers were evaluated. One comprised a poly(ethylene oxide) block and a cationic poly(2-aminoethyl methacrylate) block. The other comprised a poly(2-(diisopropylamino)ethyl methacrylate) and a poly(2-aminoethyl methacrylate) block. All three copolymers were prepared via ATRP and had relatively low polydispersities (M_w/M_n < 1.30). Covalent cross-linking was achieved by carbodiimide coupling[2] between the carboxylic acid groups in the inner shell of the micelle and the primary amine groups of the polymeric cross-linker.

These SCL micelles were extensively characterized using dynamic light scattering, ^{1}H NMR spectroscopy, aqueous electrophoresis measurements and cryo-TEM.

(1) Read, E.S.; Armes, S.P. *Chem. Commun.* **2007**, *29*, 3021.
(2) Thurmond, K.B.; Huang, H.Y.; Clark, C.G.; Kowalewski, T.; Wooley, K.L. *Colloid Surf. B-Biointerfaces* **1999**, *16*, 45.