

# pH-Responsive, Zwitterionic, Schizophrenic Diblock Copolymer Micelles by Polymerisation-Induced Self-Assembly

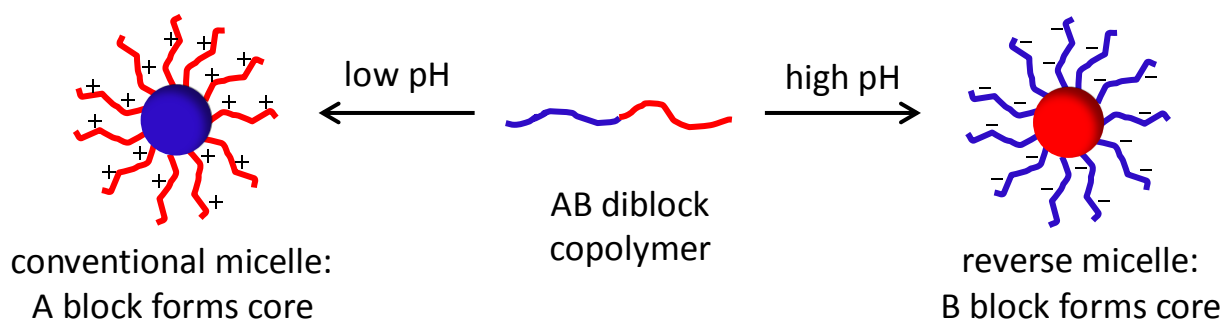
Sarah L. Canning<sup>1\*</sup>, Steven P. Armes<sup>1</sup>

<sup>1</sup> Department of Chemistry, Dainton Building, University of Sheffield, Brook Hill, Sheffield, South Yorkshire S3 7HF, UK

\*s.canning@sheffield.ac.uk

It is well-known that amphiphilic AB diblock copolymers self-assemble to form micelles in aqueous solution. Certain AB diblock copolymers are able to form two types of micelles, conventional and reverse micelles.<sup>1,2</sup> In this case, both blocks are stimulus-responsive, so adjustment of the solution conditions can be used to tune their hydrophilic/hydrophobic character. Such copolymers have been termed 'schizophrenic'.<sup>3,4</sup> Literature examples include both doubly pH-responsive and doubly thermo-responsive diblock copolymers.<sup>4,5</sup>

Polymerization-induced self-assembly (PISA) offers a robust strategy for the production of well-defined diblock copolymer nanoparticles in a wide range of solvents at high solids.<sup>6-8</sup> In particular, amphiphilic diblock copolymer nanoparticles can be prepared via RAFT aqueous dispersion polymerisation or RAFT aqueous emulsion polymerisation.<sup>6,8</sup> In the present work, we have examined PISA for the synthesis of new zwitterionic schizophrenic diblock copolymers. The copolymer chains are prepared directly in water in the form of nanoparticles via RAFT aqueous emulsion polymerisation between pH 3 and pH 7. On switching the solution pH, nanoparticle inversion occurs, as the core-forming block becomes hydrophilic and the stabiliser block becomes hydrophobic. These new nanoparticles have been characterised using TEM, <sup>1</sup>H NMR spectroscopy, DLS and aqueous electrophoresis.



**Figure 1** pH-induced 'schizophrenic' micellisation behaviour in aqueous solution.

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