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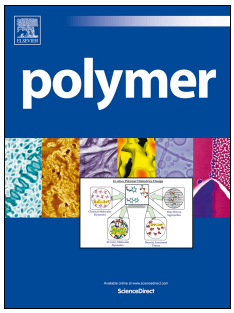

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PII: S0032-3861(16)30772-8

DOI: 10.1016/j.polymer.2016.08.092

Reference: JPOL 18989

To appear in: *Polymer*

Received Date: 5 July 2016

Revised Date: 24 August 2016

Accepted Date: 26 August 2016

Please cite this article as: Yam CH, Lee CH, Siu YS, Ho KM, Li P, Synthesis of dual stimuli-responsive amphiphilic particles through controlled semi-batch emulsion polymerization, *Polymer* (2016), doi: 10.1016/j.polymer.2016.08.092.

Synthesis of Dual Stimuli-Responsive Amphiphilic Particles through Controlled Semi-Batch Emulsion Polymerization

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Abstract

The synthesis and property of dual stimuli-responsive amphiphilic particle consisting of a hydrophobic component, a pH-sensitive poly(ethyleneimine) (PEI) and a temperature-sensitive poly(*N*-isopropyl acrylamide) (PNIPAm) have been investigated. This novel type of multicomponent polymer (MCP) particles were prepared through a one-pot controlled semi-batch emulsion polymerization which involved an initial formation of PNIPAm/PEI core-shell nanogel particle via a graft copolymerization of *N*-isopropyl acrylamide from PEI, followed by the seeded emulsion polymerization of methyl methacrylate or styrene. Properties of these MCP particles including particle composition, size, size distribution, surface charge and morphology were systematically examined. The structure of hydrophobic monomer was found to strongly influence the morphology of resultant MCP particles. The multilayered polystyrene/PNIPAm/PEI particles exhibited unique property of temperature-tunable surface charge. This property was demonstrated through studies