

Synthesis of temperature responsive polymer particles in supercritical carbon dioxide

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The temperature responsive poly(*N*-isopropylacrylamide) (PNIPPA_m) have been widely used in biomedical applications, such as drug controlled release systems, drug carrier and so on.

Supercritical carbon dioxide is considered as a useful alternative of toxic or volatile organic solvents for polymer synthesis and processing. Main advantages to use scCO₂ as a polymerization medium are that it is less-toxic, non-flammable, chemically inert and naturally abundant than many other organic solvents.

We carried out polymerization *N*-isopropylacrylamide with AIBN as the initiator using dispersion polymerization methods in supercritical carbon dioxide. And the spherical polymer particles were prepared using fluorinated dispersant and *N,N*-methylenebisacrylamide (MBIS) as cross-linking agent. The polymerizations were prepared in scCO₂ at various temperature and pressure ranges.

The resulting polymer was characterized by FE-SEM, DSC, TGA and ¹H-NMR etc.