Green and Controlled Synthesis of Poly(vinyl pivalate) in Supercritical Carbon Dioxide

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High pressure supercritical CO_2 was implemented to produce poly(vinyl pivalate) of well defined architecture as well as controlled molecular weight distribution follwed by atom transfer radical polymerization (ATRP). Polymers with wide range of molecular weights (M_n = 10–100 kg/mol) was synthesized in a controlled manner. For a better control, diversified catalytic sytems (catalyst/ligand) were implemented at different concentrations. A metal was used as a reducing agent in the practice of activator regenerated electron transfer (ARGET) ATRP. Herein, ease of separability and recyclability was exhibited by copper wire, which was also applied by altering the surface area. The metal was proved to be efficient tremendously in getting a better control in PDI (< 1.4) without falsifying the reaction rate negatively. Significant enhancement of deactivation rate constant and effective reversibility of the equilibrium in the presence of metal may be opted as the potential reason behind this. Consequently, the experimental molecular weight was also in good agreement with the theoretical one.

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