

Crystallization of L-PLA into submicron particles in supercritical carbon dioxide

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The object of this study was to investigate the effect of various organic solvents, molecular weight, and flow rate of CO₂ on particles of the poly (L-lactic acid)(L-PLA). The used materials were m.w. 85,000~160,000 and 220,000 L-PLA as a solute and DCM (dichloromethane), THF (tetrahydrofuran), and 1,4 - dioxane as a solvent and CO₂ as an anti solvent. The flow rate of CO₂ was ranged from 3l/min to 8.5l/min while the other process parameters were fixed at 40oC temperature, 80bar pressure and 1wt% concentration of L-PLA in CO₂. The finest particles were produced in case of using the DCM as a solvent for L-PLA m.w. 220,000, and 8l/min CO₂ flow rate. In case that 1.4 - dioxane was used as a solvent for L-PLA, formed particles were bigger and have a worse shape than them of the other solvent. Also, particles used L-PLA having the 220,000 molecular weight were finer than them of 85,000~160,000. The particles were analyzed by a SEM (scanning electron microscope) and PSA (laser diffraction particle size analyzer).