

Supercritical Fluids Process for Preparation of PLLA Nano particulates

이윤우*

Supercritical Fluids Research Lab, KIST

(ywlee@kist.re.kr*)

The nano-particulates of biodegradable polymer were prepared by ring-opening solution polymerization in supercritical chlorodifluoromethane followed by precipitating the polymerization products into scCO₂ as an anti-solvent.

The weight average molecular weight of the poly(L-lactic acid) product was measure to be ca. 70,000 g/mol. The use of compressed gas as a solvent for the polymerization of PLLA was attractive because compressed gas could easily be separated from the polymer by depressurization. PLLA could, therefore, be synthesized in solution but remain free of residual organic solvents to yield a high-purity polymer intended for biomedical application.

In a series of ASES experiments, the formed spherical ultra fine particles of PLLA with a smooth surface were non-agglomerated and free flowing. The mean particle diameter of PLLA nano-particles was varied from 0.06 to few micrometers with a narrow particle size distribution, which were controlled by simple manipulation of precipitation conditions including pressure, temperature, and concentration. One of important feature is that these nano-spheres do not contain any surfactants, stabilizers or solvents.