

## Design of Nano Particulate with Supercritical Fluids

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The nano-particulates of a biodegradable polymer, poly(L-lactic acid), were prepared by ring-opening solution polymerization in supercritical chlorodifluoromethane followed by precipitating the polymerization products into  $\text{scCO}_2$  as an anti-solvent. The weight average molecular weight of the poly(L-lactic acid) product was measured 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 PDA. One of important feature is that these nano-spheres do not contain any surfactants, stabilizers or solvents. Some other results for nano particles including water insoluble drug, insulin, lysozyme, BSA, trypsin, biodegradable polymers, and acetylsalicylic acid will be presented.