

Development of Lignin Nanoparticles by the Compressed CO₂ Anti-solvent Method

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Lignin is the most abundant aromatic renewable natural bio-polymer and a typical by-product of pulping and bio-ethanol industries. It has a polydisperse three dimensional network structure of aromatic groups and a number of phenolic and aliphatic hydroxyl groups which make it useful for fertilizers, binders, resins, polymer composites, pharmaceuticals, cosmeticology and so on. However, the unique chemical reactivity of lignin limits their applications in few cases. In the present study, we designed to develop lignin nanoparticles using dimethylformamide (DMF) as a solvent for dissolving lignin particles and compressed CO₂ as an anti-solvent with an aerosol solvent extraction system (ASES). The effects of CO₂ temperature, pressure and flowrate, and concentration of solution on the behavior of particles formation were elucidated by particle size, morphologies and their physico-chemical properties.