

Synthesis of Biopolymeric Nanoparticles of Starch for Packaging Reinforcement Applications

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Abstract : Biopolymers are being extensively studied in the last years as a replacement of the conventional petroleum derived polymers, especially in packaging industry. They are natural, biodegradable materials. However, the lack of good mechanical and barrier properties is a problem in the way of this replacement. One of the most abundant biopolymers in the nature is the starch, its renewable, biocompatible low cost polysaccharide, it can be obtained from wide variety of plants, it has been used in food, packaging and other industries. This work is focusing on the production a high yield of starch nanoparticles via nanoprecipitation, to be used as reinforcement filling of biopolymer packaging matrices made of different types of starch improving their mechanical and barrier properties. Wheat and corn starch solutions were prepared in different concentrations. Absolute ethanol, acetone and different concentrations of hydrochloric acid were added as antisolvents dropwise under different amplitudes of sonication and different speeds of stirring, the produced particles were analyzed with dynamic light scattering DLS and scanning electron microscope SEM getting the morphology and the size distribution to study the effect of those factors on the produced particles. DLS results show that we have nanoparticles using low concentration of corn starch (0.5%) using 0.1M HCl as antisolvent, [Z average: 209 nm, PDI: 0,49], in case of wheat starch, we could obtain nanoparticles [Z average: 159 nm, PDI: 0,45] using the same starch solution concentration together with absolute ethanol as antisolvent.

Keywords : biopolymers, nanoparticles, DLS, starch

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