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Preparation of Polylactide Nanoparticles by Supercritical Fluid Technology

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Abstract : The development of new antimicrobial materials that are not toxic to higher living organisms is a major challenge today. Newly developed materials can have high application potential in biomedicine, coatings, packaging, etc. A combination of commonly used biopolymer polylactide with cationic polymers seems to be very successful in the fight against antimicrobial resistance [1].PLA will play a key role in fulfilling the intention set out in the New Deal announced by the EU commission, as it is a bioplastic that is easily degradable, recyclable, and mass-produced. Also, the development of 3D printing in the context of this initiative, and the actual use of PLA as one of the main materials used for this printing, make the technology around the preparation and modification of PLA quite logical. Moreover, theenvironmentally friendly and energy saving technology like supercritical fluid process (SFP) will be used for their preparation. In a first approach, polylactide nano- and microparticles and structures were prepared by supercritical fluid extraction. The RESS (rapid expansion supercritical fluid solution) method is easier to optimize and shows better particle size control. On the contrary, a highly porous structure was obtained using the SAS (supercritical antisolvent) method. In a second part, the antimicrobial biobased polymer was introduced by SFP.

Keywords : polylactide, antimicrobial polymers, supercritical fluid technology, micronization
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