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WORLD CONGRESS ON SMART MATERIALS AND STRUCTURES
&
3rd International Conference on
POLYMER CHEMISTRY AND MATERIALS ENGINEERING
November 21-22, 2019 | Singapore

Drug delivery systems based on PCL nanoparticles obtained by non-aqueous emulsion polymerization

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Cancer remains one of the world's most devastating diseases responsible for more than 20% of all deaths. The conventional cancer treatments are generally associated with a series of toxic side effects: cytotoxicity, neurotoxicity, nephrotoxicity. In order to minimize these drawbacks, the achievement of reliable and efficient delivery systems of therapeutics, by the means of nanotechnology, is highly recommended.

Drug delivery systems can play a key role in the fight against cancers by delivering locally the anticancer drugs, and the efficiency of this delivery depends on several factors, such as: drug bioavailability, drug absorption processes, pharmacokinetic processes, timing for optimal drug delivery. The nanoparticles (NPs) are based on biocompatible polymers and their advantages are high drug encapsulation efficiency; improved drug bioavailability; solubility and retention time; enhanced chemical and biological stability; controlled drug release rate; wide variety of administration routes.

New controlled drug delivery systems based on poly(Ɛ-caprolactone) (PCL) biocompatible NPs were prepared by a non-aqueous emulsion polymerization starting from CL-in-PDMS non-aqueous emulsions stabilized with tailor-made PDMS-b-PCL block copolymers. In this type of emulsion, usually designated as oil-in-oil (o/o) emulsion, the monomer droplets are dispersed in a non-miscible oil and the stabilization can be achieved by using suitable block copolymers. After the polymerization reaction, the size of the obtained PCL particles, in the absence and in the presence of a model drug, was determined by DLS.

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