Abstract in English

One of the most common groups of biocompatible and biodegradable polymers for biomedical applications are polyesters, especially, polylactide. Polylactide (PLA) is biodegradable and biocompatible polyester which can be easily prepared *via* Ring-Opening Polymerization (ROP) of lactide (cyclic dimer of lactic acid) using alcohols as initiators. The mixture of polylactides with their opposite configurations can create stereocomplex as a result of the formation of a multicentre hydrogen bonds. Polylactide is frequently used for the preparation of drug delivery systems due to its non-toxicity, biocompatibility, the ability to hydrolyse, as well as the possibility of adjusting physico-chemical properties by controlling the molar mass, architecture or polymer composition. What is more, β-cyclodextrin, which is a biocompatible, non-toxic cyclic oligosaccharide consisting of seven glucose units with a well-defined ring structure and a hydrophobic inner cavity, can form stable host-guest supramolecular interactions with hydrophobic or hydrophilic drugs. The host-guest interaction (inclusion complex) can protect the drugs (guests) from premature degradation, reduce the side effects of the drugs and slower the release of the drug. The aforementioned properties of polylactide and cyclodextrin allow for the preparation of the materials in which properties of polylactide and β-cyclodextrin are perfectly combined. Three distinctive drug delivery systems were prepared: nanoparticles for the doxorubicin delivery, microparticles for the controlled delivery of atropine, as well as fibres with antibacterial properties containing quercetin. The controlled release of the drug was achieved by using the combination of two supramolecular interactions: stereocomplexation and the formation of an inclusion complex. The formation of an inclusion complex was confirmed by using three different spectroscopic techniques (1H NMR, 1H ROESY NMR, and IM-MS technique). Stereocomplex doxorubicin-loaded nanoparticles showed higher cytotoxicity than the free doxorubicin. The encapsulation of atropine inside microparticles that contain β-cyclodextrin led to the controlled release and reduction of its toxicity. Finally, appropriately modified polylactide nonwovens prevented quercetin from premature degradation.