Functionalized poly(phospho)esters towards injectable particle drug delivery systems

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Degradable polymers with tailor-made functionality and properties are essential to fulfill the requirements of drug loaded carriers for advanced injectable drug delivery systems. In that frame, amphiphilic copolymers made up of a hydrophilic PEG block and a hydrophobic poly(phospho)ester block were designed. Chemical strategies enabling the functionalization of the hydrophobic block while preventing their prematured degradation were investigated with the aim to (1) covalently graft a drug [1] or a probe for theranostic purposes [1], (2) decrease the critical aggregation concentration avoiding the premature release of drugs [2], (3) tailor the (bio)degradation rate, (4) improve the drug loading and the release profile by diffusion or degradation [2]. The implemented strategies allowing functionalization relies on the use of functional monomers (cyclic esters, carbonates and phosphates) and on post-polymerization chemical modification reactions, particularly, the thiol-ene reaction.

Besides, the formulation of such hydrophobic poly(phospho)esters as drug loaded microspheres was investigated by controlled precipitation in water using continuous flow reactors (microfluidics) and specific microchips in order to control the particles size and achieve a narrow size distribution.

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