Optimization in Nanoparticle Synthesis Methods for Drug Delivery Systems

The current years are witnessing the evolution of the third generation of controlled-release drug delivery systems, whose main research directions include the use of nanoparticles for the targeted and controlled release of bioactive compounds. In this context, the main aim is to achieve optimized synthesis procedures that allow for the control of nanoparticle size and size distribution, shape, surface chemistry, and functionality. Thus, the principal goal of the current PhD thesis is in accordance with the requirements of the pharmaceutical industry regarding drug formulation development. Specifically, in the process of developing nanoparticle-based drug delivery systems for the controlled release of drug molecules, a series of unconventional synthesis methods and the associated synthesis parameters were investigated for their potential to achieve uniformity and controllability of nanoparticle size and size distribution, high drug loading capacity, sustained release of drug molecules, and process reproducibility. Therefore, the synthesis processes were optimized in order to meet the previously described criteria that are required for obtaining suitable and efficient drug delivery systems.