Effect of Temperature and Composition on the Loading of Curcumin into PLGA/PLLA Core–Shell Nanoparticles Stabilized by Hydrophobically Functionalized Polyelectrolytes

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Streszczenie

Our research comprised use of a vessel-type batch process of curcumin (CUR) core–shell entrapment, followed by an analysis of the thermal and dielectric behavior of polymer matrices, supported by theoretical calculations of the solubilities of particular polyester-type building blocks: poly(l-lactide) (PLLA) and poly(lactide-*co*-glycolide) (PLGA). Our investigation enabled us to design and optimize a fully scalable process characterized by very high (approximately 1 order of magnitude greater than previous systems) bioactive payload loading content. The optimal temperature and composition of the core material for curcumin entrapment was calculated using HSPiP software and confirmed by microscopic observation of polymers blended with curcumin, as well as by dielectric measurements and dynamic scanning calorimetry. Optimization studies showed that the most uniform core–shell nanocarriers, characterized by excellent drug loading, were obtained for the hydrophobically functionalized polyelectrolyte (HF-PE) with ester linking groups utilizing a process temperature of 85 °C, followed by rapid cooling to room temperature.

Słowa kluczowe

Dietary supplements, Hydrophobicity, Insulators, Nanoparticles, Polymers

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