

Temperature-induced Phase Transition for the Formation of PLGA Nanospheres

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A novel method for the preparation of PLGA (poly(lactide-co-glycolide) nanospheres has been designed and characterized based on the temperature-induced phase transition in the liquidized mixture of PLGA and Pluronic (Poly(ethylene oxide)-poly(propylene oxide)-poly(ethylene oxide) triblock copolymer). PLGA with molecular weight of 100,000 or less exhibits the glass transition between 50 and 90 °C depending on the molecular weight and changes into liquid state above its glass transition temperature. Pluronic also exhibits the melting transition in the similar temperature range depending on PEO/PPO ratio. Based on these characteristics, the formation of microstructures of F-127/PLGA mixtures were induced for the preparation of PLGA nanospheres by the temperature-induced phase transition. We have identified that the microstructure of F-127/PLGA mixture can lead to the formation of PLGA nanospheres. For the application as a drug delivery vehicle, paclitaxel used as a potent anticancer drug was loaded into the PLGA nanospheres and the loading amount, the encapsulation efficiency and the release pattern from the nanospheres were measured.