

Surface-modification of lipid nanoparticle by polyelectrolyte layer-by-layer technique for drug delivery

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Abstract

Lipid nanoparticles (LNs) have been used as a drug delivery system because of their non-toxicity and low cost; nonetheless, there have still been some limitations which need to enhance such as stability of particles, control-release profile as well as long term drug encapsulation. Consequently, this study focused on surface modification of lipid nanoparticles (LNs) by a layer-by-layer (LBL) coating method using polydiallyl dimethylammonium chloride (PDADMAC) as a positive polyelectrolyte and polystyrene sodium sulfonate (PSS) as a negative polyelectrolyte to overcome the drawbacks of nanoparticles. The LNs were prepared by a hot homogenization method, with compritol and miglyol being used as solid lipid and oil respectively, stabilized by Tween 80 as non-ionic surfactant. Using the determined optimum conditions, this LBL method promoted alteration of the charge of LNs greater than ± 20 mV for each layer detected by zetasizer. The increased particle size after coatings suggested successful LBL formation. However, atomic force and scanning electron microscopy were also employed to investigate the topology and morphology of LNs.

Keywords: Layer-by-layer, Polyelectrolyte, Lipid nanoparticles