Layer by Layer RNA encapsulation for genetic therapy nanodevices construction

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RNA based therapies, like siRNA based gene expression silencing, offer a series of advantages over the challenges of traditional heterologous DNA based therapies for the treatment of genetic disorders, including the endogenous control of the expression of the target gene and the relative shorter therapeutical agents [1].

One of the main issues of RNA based therapies is to find a carrier system that allows controlled delivery of the nucleic acid, improving transfection efficacy in the target cells and protecting therapeutical agents from nuclease degradation.

The Layer by Layer (LBL) technique, based on the alternative assembly of oppositely charged polyelectrolyte molecules, is a very versatile tool for the fabrication of thin polymer film with controlled features at the nanoscale [2]. We have applied the LBL technique to encapsulate purified total RNA between polyelectrolyte layers as a negative charged biopolyelectrolyte in Chitosane/Alginate/RNA and PAA/PEI/RNA systems on planar surfaces and colloidal PLGA particles.

RNA assembly in the multilayers was monitored trough Quartz Crystal Microbalance with Dissipation (QCM–D) and ζ-Potential measurements. RNA delivery after multilayer degradation was measured trough a fluorescence assay with intercalating fluorescent tags.

Layer by Layer encapsulation offers several advantages in the development of therapeutical carriers, because allows sustained delivery of one or different encapsulated agents. Besides that, LBL multilayer are suitable for further surface modification [3] which can provide recognition functions to the carrier improving selective uptake in target cells.

Figure

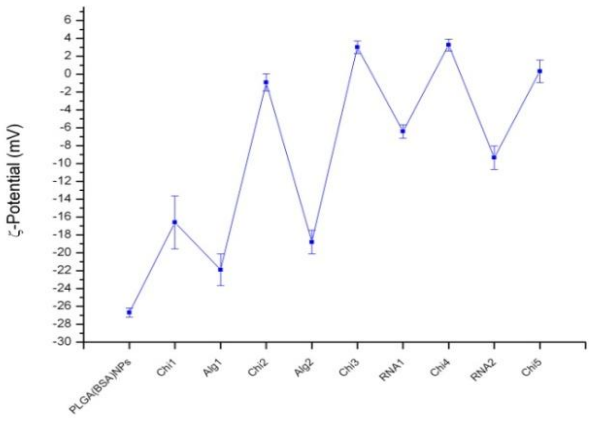

Figure 1. Changes in ζ-Potential in Layer by Layer assembling of Chitosan, Alginate and RNA polyeletrotolytes on PLGA nanoparticles.

References

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