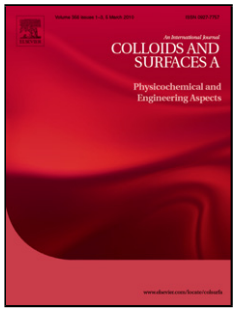

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Rationally designed double emulsion process for co-encapsulation of hybrid cargo in stealth nanocarriers

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Abstract

Double emulsion process has become highly promising for development of PEG-ylated nanocarriers (NCs) with co-encapsulated hybrid model agents, i.e, hydrophilic deoxyribonucleic acid (DNA) and hydrophobic Thiazole Orange (TO) dye, in the double compartment structure to protect them from the environmental conditions and to investigate different parameters affecting the size, charge and morphology as well as colloidal and biological stability of the final theranostic nanosystems. Different stabilizing agents including surfactants: Cremophor A25, Cremophor RH 40, Poloxamer 407, di-C_{12}DMAB as well as polymers: PEG-PDLLA, PEG-PLGA, PEG-PCL, were screened to choose suitable ones for this approach. The average size of the synthesized NCs measured by dynamic light scattering (DLS) remained < 200 nm. The encapsulation efficiency of the hybrid cargo was confirmed by UV-Vis spectroscopy. Morphology and shape of the loaded nanocontainers were investigated by transmission electron microscopy (TEM) and atomic force microscopy (AFM). Time-depended colloidal stability studies with DLS and ζ-potential followed by turbidimetric technique allow to select only the long-term nanosystems to final investigation the "stealth" properties of the fabricated PEGylated NCs.