

Multifunctional Nanoengineered Cargo Systems Based on Polyelectrolyte Capsule

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One of the challenges in the field of (bio)-nanotechnology is the development of nano-sized delivery systems comprising different functionalities. These systems should carry bioactive substances to predefined site and unload them in controlled manner. Capsules assembled layer-by-layer have been intensively studied in the past few years owing to their ability to be modified, their capacity to encapsulate a wide range of chemicals, their responsiveness to different factors, and the variety of functionalities with which they can be enhanced. Current research focuses on the development of carriers with remote guiding and activation (optical, magnetic or ultrasound), thereby addressing unique *in vivo* applications with multifunctional biomaterials. Submicron-sized capsules are good models to mimic biochemical processes in a confined geometry that imitates cell organelles. Moreover, the cellular and tissue-targeted delivery of the capsules might serve as an intracellular reporter or enzymatic reactor. However, several obstacles still have to be overcome before capsule technology can be implemented. Their possible solutions as well as promising applications are discussed