Multifunctional LbL-Microcarriers as a Specific Drug Delivery System

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The modular construction of Layer-by-Layer carrier systems by the stepwise adsorption of polymers onto a solid nano- or micro sized template provides a high multi-functionality. Core or hollow shell, multilayer and surface can be independently functionalized with active agents (therapeutics), sensor or reporter molecules (diagnostics) and reactive components (trigger function).

An overview of our own investigations illustrates the ability of such systems to work as a multifunctional carrier in biomedical application. Specific surface modification, such as by cell-penetrating peptide, antibody or virus particle assembly, strongly influences their uptake characteristics providing accelerated or targeted incorporation [1,2]. Once safely integrated, active agents transported within different layer depths of the multilayer not only allow the application of a defined dosage to the aimed cell but also provide a controlled release by layer depth-depending disassembly kinetics [3,4]. The additional integration of sensor molecules or nano-particles facilitate a localization of the carrier in relation to the release function: with such a multiple-functionalized system, state of release can be correlated with the final cell compartment containing the carrier [5,6]. Thus, design and functionalities can be adjusted towards specific uptake, intracellular carrier processing and targeting of the desired destination before controlled disassembly.

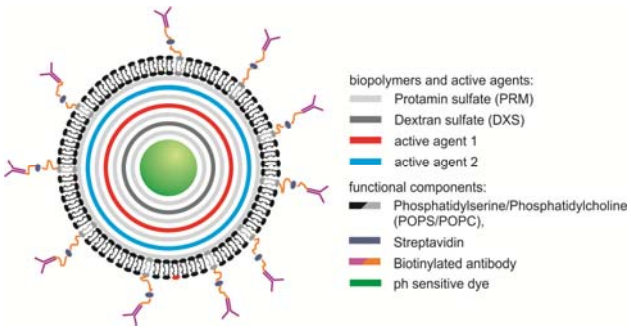

Figure 1: Schematic presentation of a multifunctional LbL carrier

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