

Martin-Luther-Universität Halle-Wittenberg
Naturwissenschaftliche Fakultät II
Chemie und Physik
SFB TRR 102



POLYMER- UND SOFT-MATTER-SEMINAR

am Dienstag, dem 12.06.2012, 17.15 Uhr

VDP 1.27 Seminarraum Chemie, Von-Danckelmann-Platz 4,
06120 Halle

Es spricht:

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Topic:

“Hydroxyethyl starch-decorated core-shell polyplexes with controlled shielding and deshielding”

Abstract:

Non-viral nucleic acid delivery systems hold promise in the therapy of severe diseases that are currently difficult to cure, most notably cancer. However, polymeric nanoparticles have to overcome many extracellular and intracellular obstacles during transport to their desired site of action, such as uncontrolled binding to non-target cells and proteins, *in vivo* aggregation and rapid removal by the mononuclear phagocytic system (MPS). Sufficient long circulation in the bloodstream is essential to allow passive targeting by the enhanced permeation and retention (EPR) effect in leaky tumor and inflammatory regions. Coating nanoparticles with poly(ethylene glycol) (PEG) is the state-of-the-art technology to shield polymeric particles, but such PEGylated “stealth particles” reduce the transfection efficiency due to hindered cellular uptake and payload release. This is known as the “PEG dilemma” in gene delivery.

A novel approach is presented for tackling the problem of achieving both protein-repellent properties for gene delivery systems (i.e. shielding), as well as efficient cellular uptake (upon deshielding). For this purpose, nanoparticles with a dandelion-like structure were designed. These consisted of polyplexes having a corona from hydroxyethyl starch (HES). The biodegradation of HES through amylase can be controlled through HES’ molar mass and molar substitution, a property which can be used to control the shielding and deshielding of polyplexes. Supporting proof of concept experiments will be presented.

