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Engineering binding cavities and surface amphiphilicity at the molecular scale for efficient in vivo drug delivery

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch Fortsetzungsanträge)

Bewilligung: 31.03.2014

Laufzeit: 3 Jahre

Shape-persistent polyphenylene dendrimers (PPDs) with a chromophore core, varying am-phiphilic surface patterns and tuneable lipophilic inner cavities are achieved by rational design from tailored molecular building blocks. Adjustable inner lipophilic binding pockets allow the accommodation of various numbers of guest molecules, which is an important feature of natural transport proteins. The orientation, size and nature of the amphiphilic surface patterns have a distinct impact on solubility and aggregate formation of the resultant nanosized PPDs. We will unravel unique insights into the influence of sub-nanometer patches on mesoscopic features such as vesicle formation, membrane uptake and cellular toxicity. The ultimate goals are chemically inert and efficient drug transporters for the cell-specific delivery (targeting) of cytotoxic tumor therapeutics with preferential uptake by cancer cells over phagocytes. The results will be further validated in in-vivo systems, namely the chick chorioallantoic membrane (CAM) model bearing human tumor xenografts and in an orthotopic mouse model of human breast cancer.

Projektbeteiligte

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Open Access-Publikationen

A Polyphenylene dendrimer drug transporter with precisely positioned amphiphilic surface patches
Controlling Cellular Uptake and Toxicity of Polyphenylene Dendrimers by Chemical Functionalization
The CAM cancer xenograft as a model for initial evaluation of MR labelled compounds. accepted (2017).