

# Universal Multishell Nanotransporters

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*dla Asi*



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## Table of contents

<b>List of abbreviations</b>	<b>III</b>
<b>Nomenclature of polymers and core-multishell architectures</b>	<b>V</b>
<b>1. General introduction</b>	<b>1</b>
1.1. Classification of polymers due to geometrical shape	1
1.2. Dendrimers	2
1.3. Hyperbranched polymers	7
1.4. Biocompatible Poly(ethers) materials for medical applications	12
1.5. Supramolecular systems for nanocompartmentation	14
1.5.1. General aspects of nanocompartmentation	14
1.5.2. Block-copolymer micelles	19
1.5.3. Liposomes, polymeric liposomes, "Stealth" liposomes	23
1.5.4. Core-shell architectures with dendrimers and hyperbranched polymers and their applications	27
<b>2. Scientific goals</b>	<b>36</b>
<b>3. Dendritic core-multishell architectures with PEI core</b>	<b>38</b>
3.1. Introduction	38
3.2. Synthesis of core-shell architectures	40
3.3. Stability and solubility of core-multishell architectures in various types of solvent	46
3.4. Determination of the transport capacity (TC) of core-multishell architectures	50
3.4.1. Universal transport abilities of nanotransporters	53
3.4.2. Dependence of the TC on the molecular weight of PEI core	58
3.4.3. Dependence of the TC on the length of mPEG chain	62
3.4.4. Dependence of the TC on the length of the aliphatic chain	65
3.4.5. Dependence of the TC on the degree of functionalization (DF) of the core	69
3.4.6. Dependence of the TC on the concentration of the polymer	71
3.4.7. The dynamics of the encapsulation process by core-multishell architectures	78
3.4.8. Summary and discussion of the transport capacity	84
<b>4. Dendritic core-multishell architectures with PG-amine core</b>	<b>88</b>
4.1. Introduction	88
4.2. Synthesis of the core-multishell architectures with PG core	88
4.3. Determination of the transport capacity of core-shell architectures	

with PG-amine core	93
<b>5. Dendritic core-multishell architectures with PAMAM core</b>	<b>101</b>
5.1. Introduction	101
5.2. Synthesis of core-shell architecture with PAMAM core	101
5.3. Determination of the transport capacity for PAMAM based core-multishell architectures	103
<b>6. Analysis of the transport phenomena</b>	<b>107</b>
6.1. Molecular modelling of core-multishell architecture	107
6.2. CAC measurement for various core-multishell architectures	108
6.3. Dynamic light scattering measurements of polymers	111
6.4. CryoTEM measurements of the polymers	117
6.5. Negative staining TEM	119
6.6. AFM measurements of the polymers	120
6.7. Discussion of the transport theory of supramolecular aggregates	123
<b>7. Biomedical applications of core-multishell architectures</b>	<b>130</b>
7.1. Core-multishell architectures as nanotransporters for antibacterial and fungicidal applications	130
7.1.1. Introduction	130
7.1.2. Preparation of silver loaded nanotransporters, results and discussion	131
7.2. Core-multishell architectures as drug delivery and <i>in vivo</i> imaging agents for anti-tumor therapy	138
7.2.1. Anti-tumor drug delivery agent	138
7.2.2. <i>In vivo</i> tumor imaging agent	140
<b>8. Summary and Conclusions</b>	<b>142</b>
<b>9. Outlook</b>	<b>149</b>
<b>10. Experimental part</b>	<b>151</b>
10.1. Materials and Methods	151
10.2. Synthesis of dendritic core-multishell architectures	156
<b>11. Bibliography</b>	<b>178</b>
<b>Appendices</b>	<b>194</b>

## List of abbreviations

Ac	acetal
AFM	atomic force microscopy
<i>t</i> -BOC	<i>tert</i> -butyloxycarbonyl, <i>tert</i> -butyloxy protective group
CAC	critical aggregate concentration
CDCl <sub>3</sub>	deuterated chloroform
CH <sub>2</sub> Cl <sub>2</sub>	dichloromethane (DCM)
CMC	critical micelle concentration
conc.	concentrated
const.	constant
D	dendritic unit
<i>DB</i>	degree of branching
DCC	<i>N,N'</i> -dicyclohexylcarbodiimide
DCU	1,3-dicyclohexylurea
DF	degree of (core) functionalization
DF <sub>A</sub>	absolute degree of (core) functionalization
DF <sub>NH2</sub>	absolute degree of PG (core) functionalization with amine groups
DF <sub>PG</sub>	absolute degree of PG-amine core functionalization
DLS	dynamic light scattering
DCM	dichloromethane (CH <sub>2</sub> Cl <sub>2</sub> )
DMF	<i>N,N'</i> -dimethylformamide
DMSO	dimethyl sulfoxide
DMSO- <i>d</i> <sub>6</sub>	deuterated dimethyl sulfoxide
DNA	deoxyribonucleic acid
DOXO	doxorubicin
<i>DP<sub>n</sub></i>	degree of polymerization
DPH	diphenylhexatriene
eq.	equivalent
Et <sub>2</sub> O	diethylether
EtOH	ethanol
FDA	Food and Drug Administration
h	hour
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid
HONSu	<i>N</i> -hydroxysuccinimide
HOPG	highly ordered pyrolytic graphite
Hz	Hertz

K	partition coefficient (distribution coefficient)
L	linear unit
LED	light emitting diode
OLED	organic light emitting diode
OMs	O-mesylate group
MeOH	methanol
MHz	MegaHertz
min	minute
mPEG	monomethyl poly(ethylene glycol) ether
$M_n$	number average molecular weight
MsCl	mesylchloride
MTX	methotrexate
$M_w$	weight average molecular weight
MWCO	molecular weight cut-off
<i>MWD</i>	molecular weight distribution ( $M_w/M_n$ )
NIPAM	<i>N</i> -isopropylacrylamide
NMR	nuclear magnetic resonance
PAA	poly(acrylic acid)
PAMAM	poly(amidoamine)
PCPP	poly(dicarboxylatophenoxyphosphazene)
PD	polydispersity
PG	polyglycerol
PEAA	poly(2-ethylacrylic acid)
PEI	poly(ethylene imine)
PEG	poly(ethylene glycol)
PEO	poly(ethylene oxide)
PHPMA	<i>N</i> -(2-hydroxypropyl)methacrylamide
PIHCA	polyisohexylcyanoacrylate
PLGA	poly(D,L-lactic-co-glycolic acid)
PNIPAM	poly- <i>N</i> -isopropylacrylamide
POE	poly(orthoethers)
PPh <sub>3</sub>	triphenylphosphine
PPh <sub>3</sub> O	triphenylphosphine oxide
PPI	poly(propylene imine)
ppm	parts per million
PTSA	<i>p</i> -toluenesulfonic acid, 4-methylbenzenesulfonic acid
PVP	poly(vinylpirolidone)

quant.	quantitative
RB	rose bengal
r.t.	room temperature
RNA	ribonucleic acid
SAXS	small-angle X-ray scattering
SEC	size exclusion chromatography
T	terminal unit
TC	transport capacity
TC <sub>rel</sub>	relative transport capacity
TEM	transmission electron microscopy
TLC	thin layer chromatography
UV/Vis	Ultra-Violet / Visual range spectroscopy

## Nomenclature of polymers and core-multishell architectures

### Polymers, dendrimers, and chemicals

PEI <sub>z</sub>	hyperbranched poly(ethylene imine) (PEI), $z = M_n$ [g mol <sup>-1</sup> ]
PG <sub>z</sub>	hyperbranched polyglycerol (PG), $z = M_n$ [g mol <sup>-1</sup> ]
PAMAM[G5]	poly(amidoamine) dendrimer, 5 <sup>th</sup> generation, 64 -NH <sub>2</sub> groups (T)
mPEG <sub>m</sub>	methoxy poly(ethylene glycol), $m$ = average number of glycol unit per polymeric chain.
C <sub>6</sub>	adipic acid (1,4-butanedicarboxylic acid)
C <sub>12</sub>	1,12-dodecanedioic acid
C <sub>18</sub>	1,18-octadecanedioic acid
C <sub>x</sub> mPEG <sub>y</sub>	$x$ -(methoxy-poly[ethylene glycol]-oxy)- $x$ -oxo-dioic acid (amphiphile) where $x$ is aliphatic chain length equal to the length of the dioic acid chain and $y$ is average number of glycol units per poly(ethylene glycol) chain
(C <sub>x</sub> mPEG <sub>y</sub> )-ONSu	1-(2,5-dioxopyrrolidin-1-yl)-(x)-methoxy-poly(ethylene glycol)yl – dioate (amphiphile active ester) where $x$ is aliphatic chain length equal to the length of the dioic acid chain and $y$ is average number of glycol units per poly(ethylene glycol) chain. Activation <i>via</i> <i>N</i> -hydroxysuccinamide active ester.

## Core-multishell architectures

- $\text{PEI}_z(\text{C}_x\text{mPEG}_y)_a$  nomenclature of the core-multishell architectures with PEI core; numbers indicates:  $z = M_n$  [ $\text{g mol}^{-1}$ ] of the core,  $x$  = inner shell carbon chain length,  $y$  = outer mPEG shell number of glycol units, and  $a$  = degree of functionalization of the terminal  $\text{NH}_2$  groups.
- $\text{PG}_z(-\text{NH}_2)_a(\text{C}_x\text{mPEG}_y)_b$  nomenclature of the core-multishell architectures with PG-amine core; numbers indicates:  $z = M_n$  [ $\text{g mol}^{-1}$ ] of the core,  $a$  = degree of functionalization of the PG core with amine groups,  $x$  = inner shell carbon chain length,  $y$  = outer mPEG shell number of glycol units, and  $b$  = degree of functionalization of the  $\text{NH}_2$  groups.
- $\text{PAMAM}[\text{G5}](\text{C}_x\text{mPEG}_y)_a$  nomenclature of the core-multishell architectures with PAMAM [G5] dendrimer as a core; numbers indicates:  $x$  = inner shell carbon chain length,  $y$  = outer mPEG shell number of glycol units, and  $a$  = degree of functionalization of the  $\text{NH}_2$  groups.



