

# Universal Multishell Nanotransporters

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*dla Asi*



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## 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.



