Electronic Supplementary Material (ESI) for Soft Matter

Architectural layer-by-layer assembly of drug nanocapsules with PEGylated polyelectrolytes

Tatsiana G. Shutava,[a] Pravin P. Pattekari,[a] Kirill A. Arapov,[a] Vladimir P.Torchilin [a] and Yuri M.Lvov[a]
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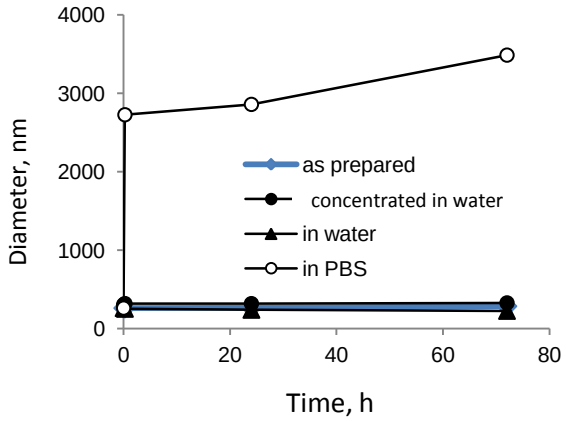
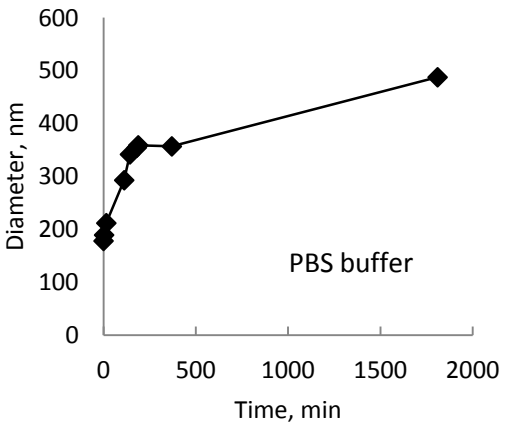
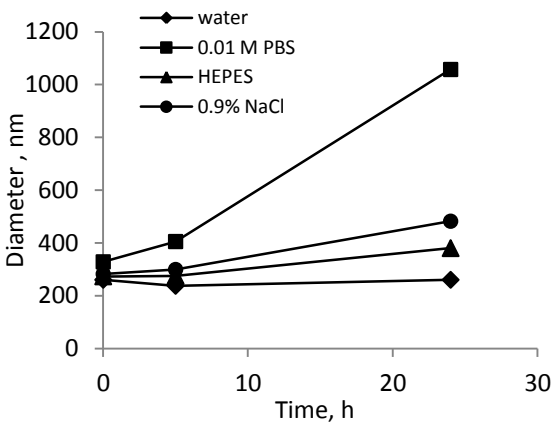
Supplementary Information



a



b



c

Fig. A Colloidal stability of LbL- coated paclitaxel nanoparticles (prepared in water) in different media. Shell: a) $(PLL/Hep)_4/PLL$ b) $(PLL/Hep)_4/PLG65[4.5]5/Hep$, b) $(PLG65[4.5]5/Hep)_4$

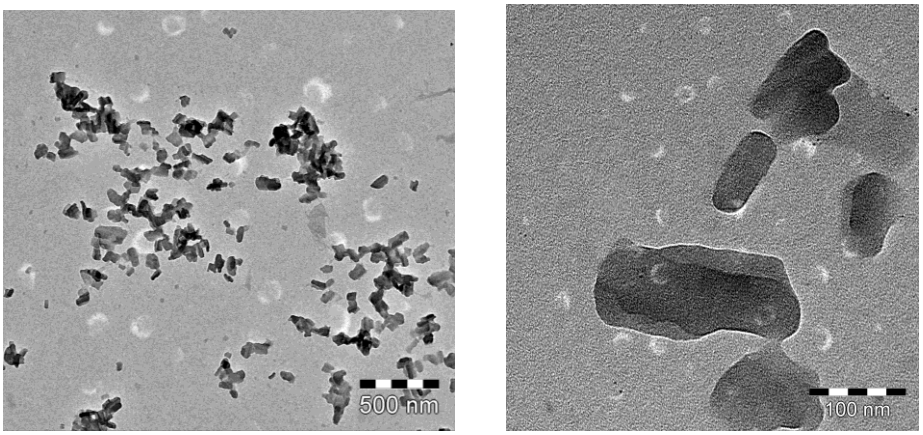
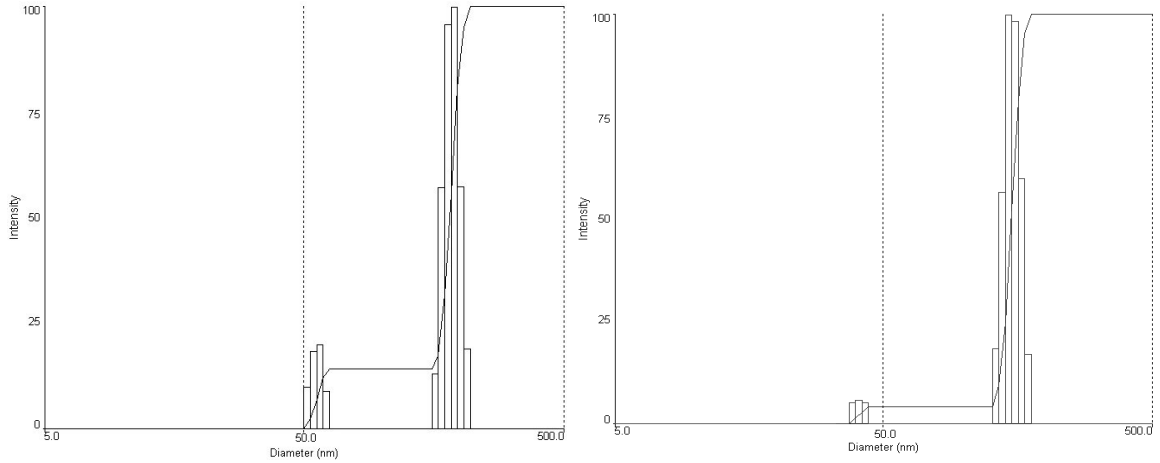


Fig.B TEM images of camptothecin nanoparticles coated with a Hep/(PLB16-5/Hep)$_4$ shell

Table A. Content of surfactants remaining adsorbed on PXT colloids*

Surfactant	Recovery of crystalline PTX nanoparticles, %	Amount of surfactant, remaining adsorbed on nanoparticles, μmol/mg PTX	Hydrodymanic diameter, nm
Docusate sodium salt (AOT)	84.2±7.4	1.03±0.23	140-210
Glyclic acid ethoxylate oleyl ether (Oleth-6 carboxylic acid)	89	0.56	92.5±2.5
Glycolic acid ethoxylate lauryl etther (Laureth-6 carboxylic acid)	64	0.65	126.6±2.5
Dodecyl sulphate sodium salt (SDS)	76	0.17	2000-9000
SDS- no PVP	~100	0.27	~300
Poly(maleic acid-co-olefin) sodium salt	-	0.17-0.25	122.5±2.0

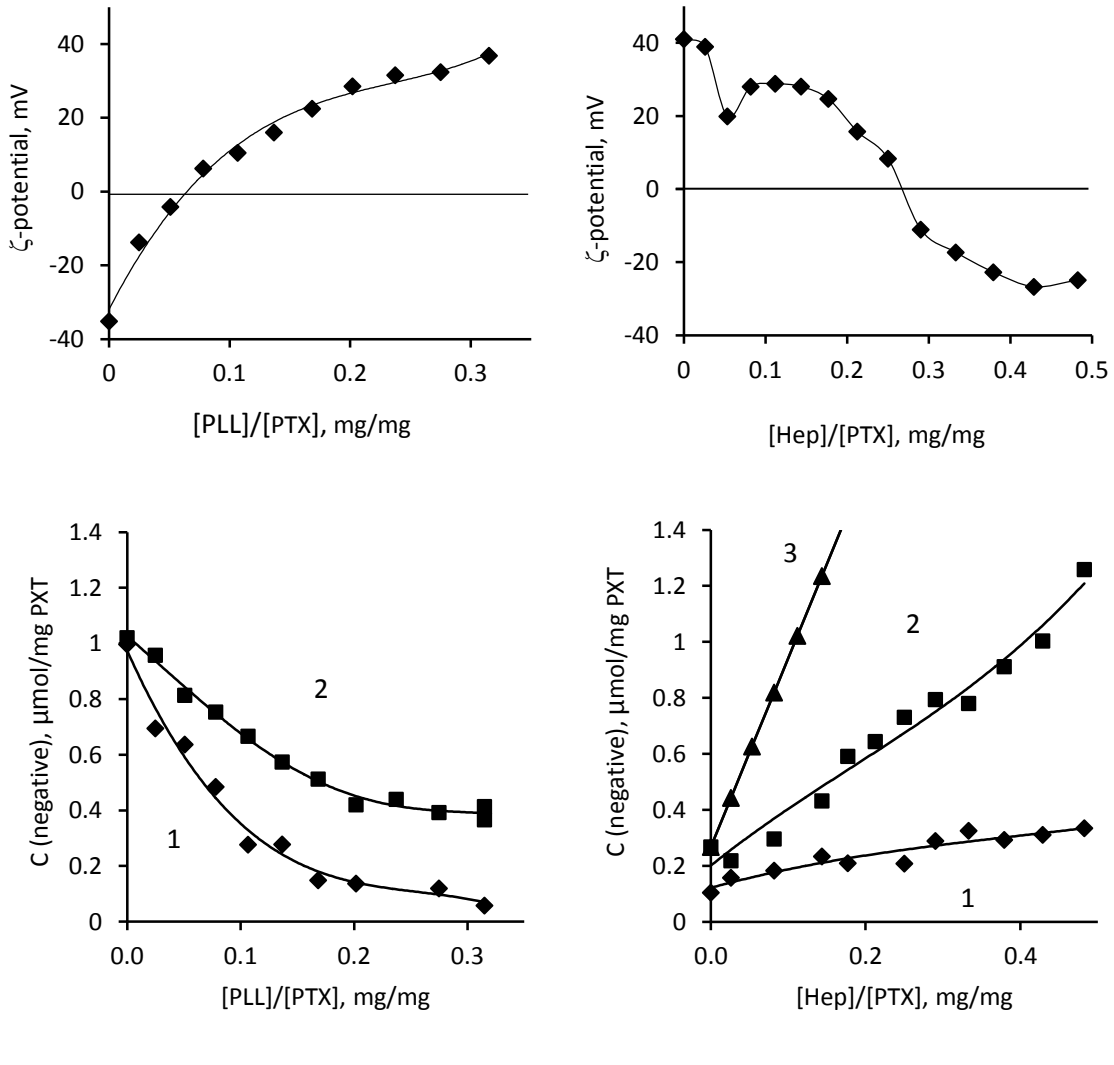
*The amount of surfactans adsorbed on PTX nanoparticles was estimated using the pinacyanol assay for negatively charged sites.



a b

Fig. C DLS distribution of apparent hydrodynamic diameter of LbL coated PTX nanoparticles as prepared.

Shell: a) $(PLB16\text{-}5/Hep)_{3.5}$;b) $(PLB16\text{-}5/Hep)_{7.5}$



a b

Fig. D Changes of ζ-potential (upper row) and amounts of negative sites estimated by the pinacyanol assay (lower row) in the process of step-wise addition of a) PLL to PTX/AOT cores, b) Hep to PTX/AOT/PLL nanoparticles. Lower row: 1 – nanoparticles, 2- total experimental, 3 – calculated.

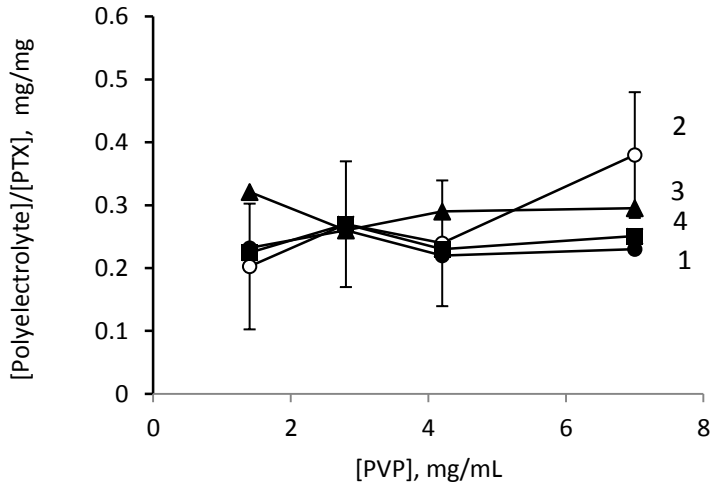


Fig.E Influence of PVP concentration on amounts of PLB16-5 (1, 3) and Hep (2, 4) added to reverse ζ-potential of nanoparticles. The polyelectrolytes were added in the following orders: 1-2-3-4

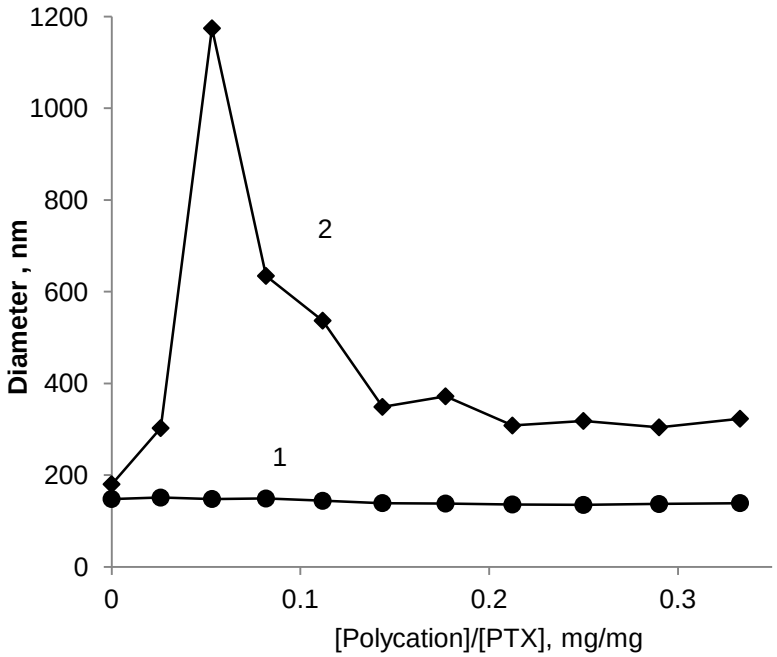


Fig. F Changes of apparent hydrodynamic diameter of PTX nanoparticles in the process of step-wise addition of heparin to nanoparticles coated with a PLB16-5 (1) and a PLL (2) layer

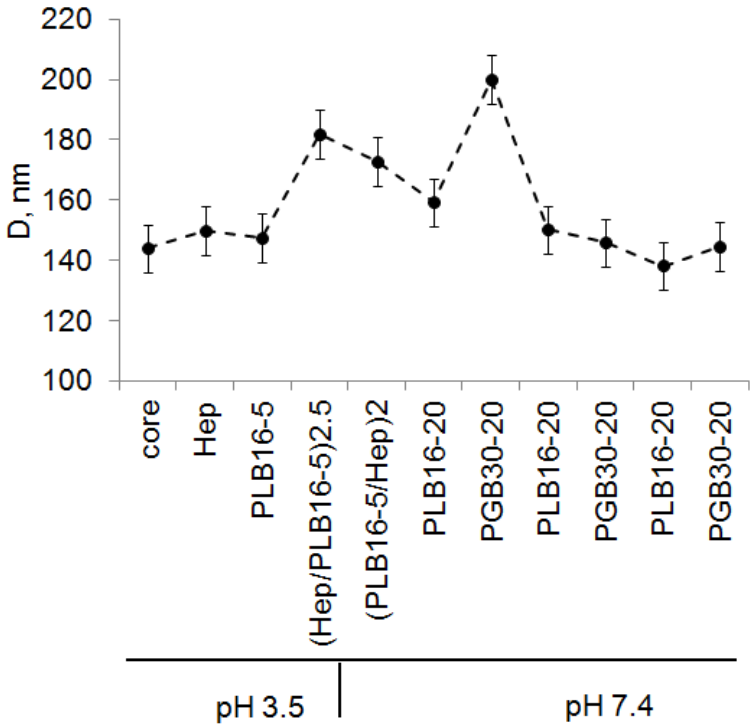


Fig.G Changes of hydrodynamic diameter of CPT nanoparticles upon adsorption of different polyelectrolytes on their surface (*a ZetaPlus Brookhaven* instrument)

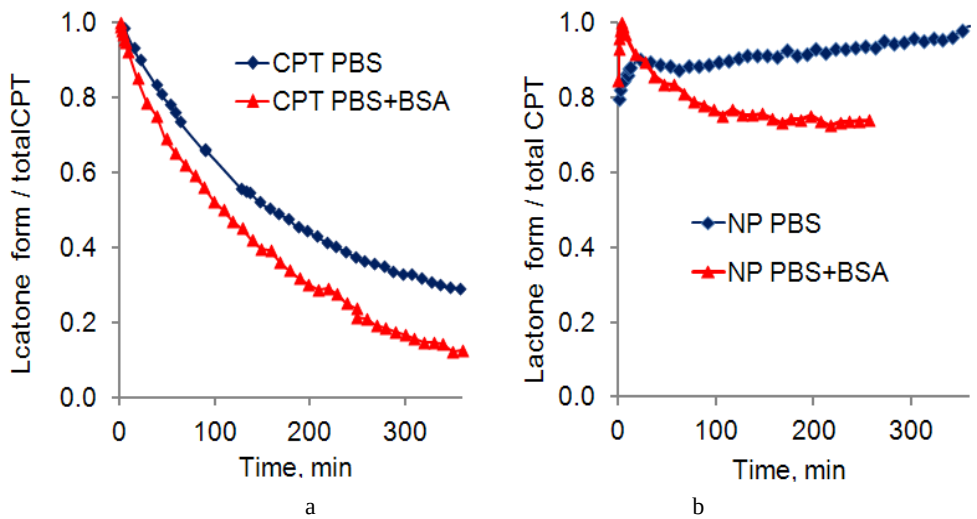


Fig.H Degradation of the lactone (353 nm) form of CPT in PBS buffer and a 40 mg/mL BSA solution. a) free CPT added in DMSO, b) 180 nm nanoparticles coated with a Hep/$(PLB16\text{-}5/Hep)_3$/$(PLB16\text{-}20/PGB30\text{-}20)_{2.5}$ shell. 23 ^{0}C, pH 7.4, C(CPT)=3.5 µg/mL

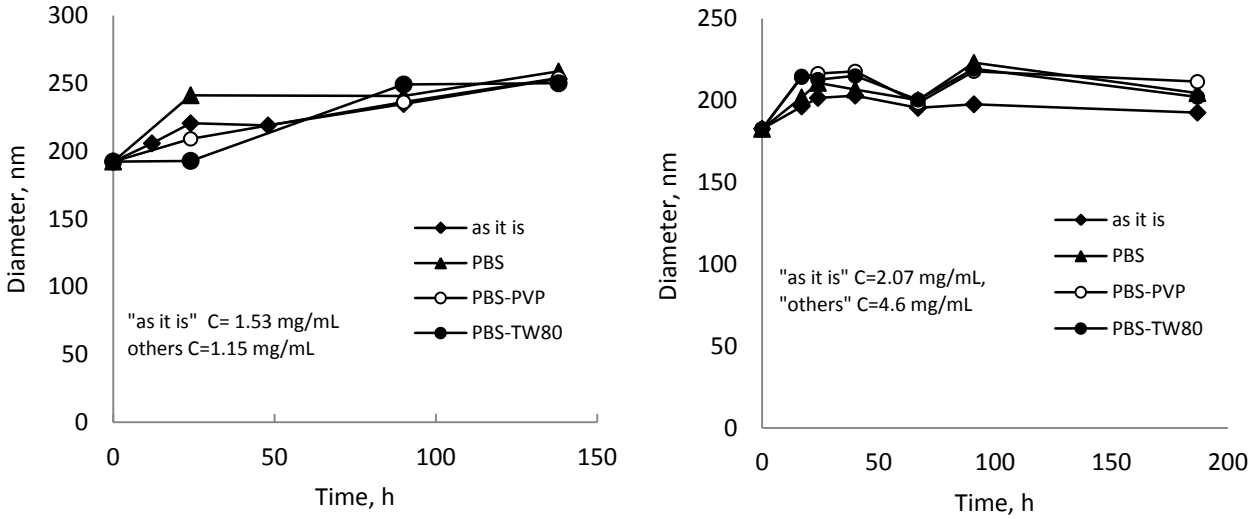


Fig. I Apparent diameter of selected samples of PTX nanoparticles coated with a $(PLB16\text{-}5/Hep)_{3.5}$ shell as a function of time. Samples were dispersed in: supernatant (" as it is"), PBS, PBS-0.7 mg/mL PVP, PBS+ 0.7 mg/mL Polysorbate 80. Concentrations as shown on the graphs

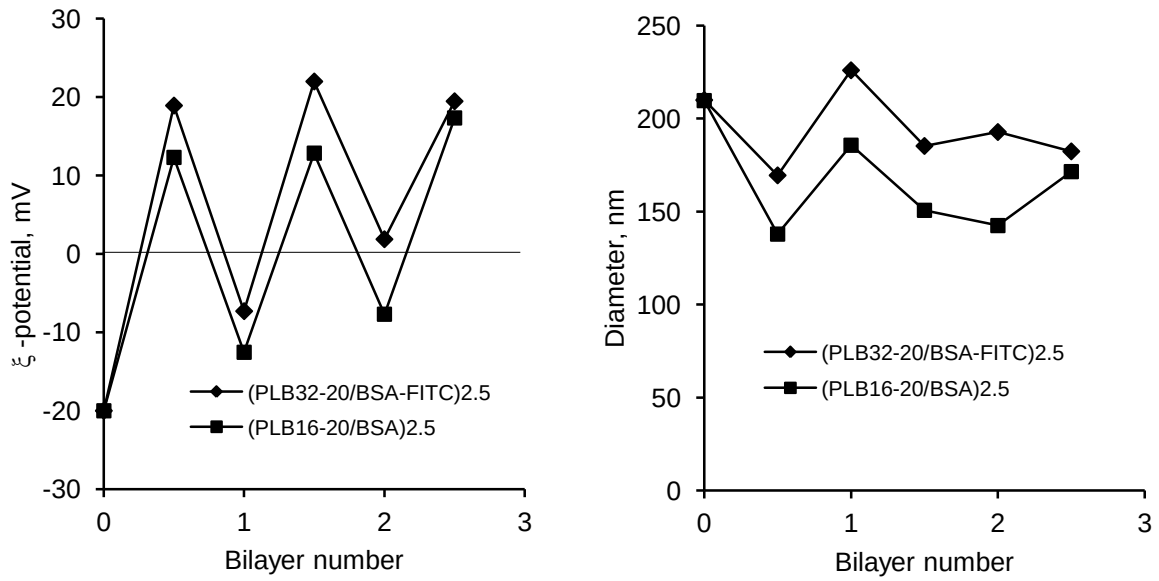


Fig.J Changes of ζ- potential (a) and hydrodynamic diameter (b) in the process of LbL assembly using BSA. Shell architecture is shown on the graphs

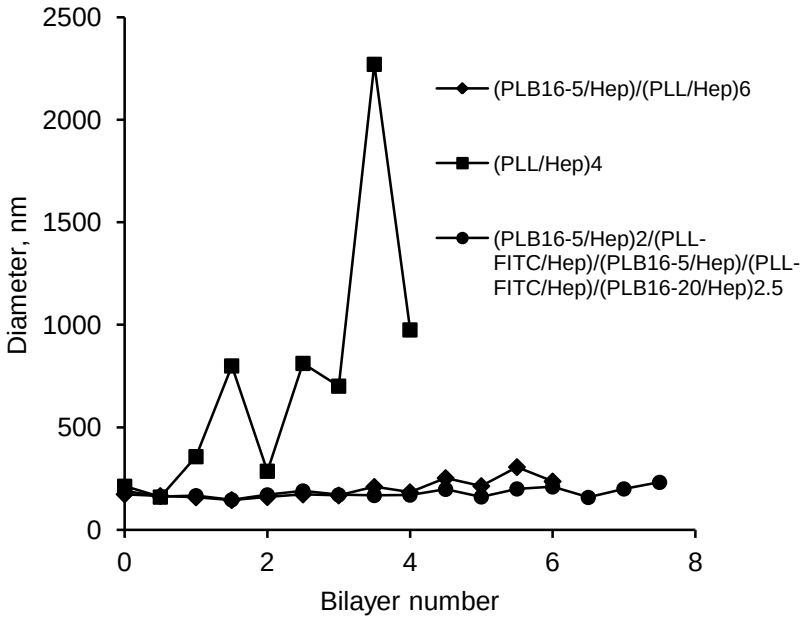


Fig. K Changes of hydrodynamic diameter in the process of LbL assembly of shells with different architecture using non-PEGylated and PEGylated polylysines.

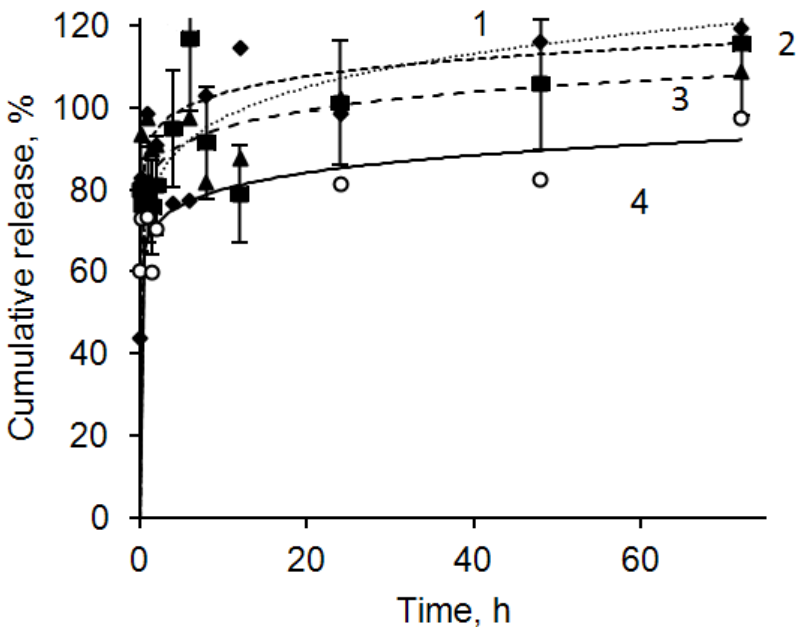


Fig. L Paclitaxel release from 170 nm nanocolloids coated with a $(PLB16\text{-}5/Heparin)_n$ shell.

Number of bilayer in shell n: 1- 0.5, 2-1.5, 3-2.5, 4-3.5. C(PTX)=2.0±0.4 μg/mL. 0.2% Polysorbate80 in PBS at 37 ^{0}C.

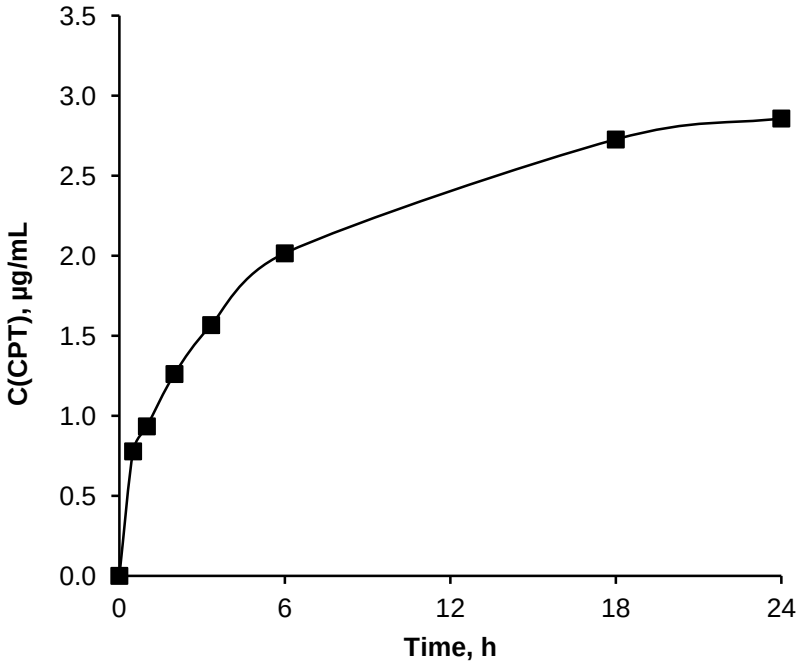


Fig. M Release of camptothecin from 160 nm nanocapsules with a $(Hep/PLB16\text{-}5)_{4.5}$ shell architecture.

PBS + 2% Polysorbate 80. C (CPT) = 9.3 µg/mL