Supporting Information

Biodegradable Poly(ethylene glycol)-Poly(ε-carprolactone) Polymeric Micelles with Different Tailored Topological Amphiphilies for Doxorubicin (DOX) Drug Delivery

As referred to many literatures[1-10], the UV-Vis and fluorescence measurements were reported to assay the concentration of DOX. In this study, these methods were also used to determine the DOX concentration. The linearity, precision, accuracy and specificity of those methods were also tested as shown in Fig. S1, S2 and Tab.S1, S2, and S3.

First, the full absorption spectra of DOX and the synthesized copolymers in DMF were measured in the range of 300–700 nm. The results (Fig.S1 A) showed that the maximum absorption peak of DOX appeared at 485 nm, nearly no adsorption peak of copolymer was observed in those wavelengths. The calibration curve of DOX in DMF had been measured at the wavelength of 485 nm. The absorption values of a series of standard solutions with the DOX concentration ranged from 2 μg/mL to 50 μg/mL were tested. Three parallel samples were measured to gain the average value. The calibration curve of DOX/DMF was obtained by plotting the mean absorbance value versus the concentration of DOX. The regression equation of standard addition curve was obtained as follows: y=0.01983x-0.00558, where y is the absorbance value and x is the concentration of DOX. The R square of the regression equation was 0.99996, indicating the obtained equation used to determine the DOX concentration was shown good linearity as the DOX concentration was in the range of 2 μg/mL to 50 μg/mL measured by UV-vis measurement. Moreover, the standard deviations of the samples were all less than 0.1‰ (Table S1), indicating good precision of this method.

In order to determine the accuracy of this method, the interday and intraday accuracy were detected (Table S2). The samples were detected every four hours to get the intraday accuracy and every week to get the interday accuracy. The accuracy was obtained as the ratio of the observed concentration to theoretical concentration and the results showed that this method showed good accuracy.

Additionally, the linearity, precision and specificity of fluorescence method with the excitation wavelength at 485 nm and emission wavelength at 550 nm was tested. Three parallel samples were measured to gain the average value. The standard curve and the fluorescence absorption curve were showed in figure S2，implying a good linearity and specificity of this method. The standard deviations of the samples were all less than 2.5% (Table S3), indicating the method had a good precision. We calibrate the standard curve each time we measured.

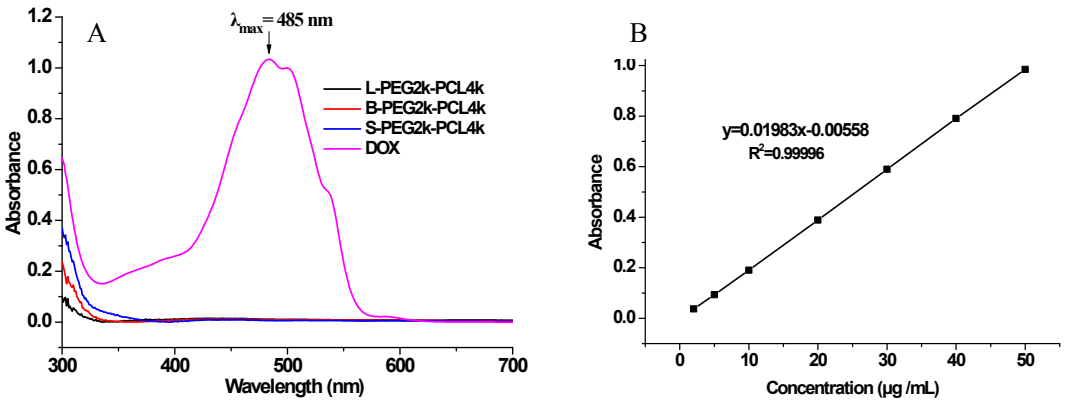


Fig.S1 The full adsorption wavelength spectrum of DOX and the copolymers (A) and the standard curve of DOX in DMF (B) tested by UV-vis method.

Table.S1 The absorbance of DOX in DMF tested by UV-vis

Concentration（μg/mL）	2	5	10	20	30	40	50
	0.0373	0.0933	0.1904	0.3883	0.5897	0.7906	0.9849
Absorbance	0.0373	0.0932	0.1903	0.3883	0.5896	0.7908	0.9847
	0.0372	0.0932	0.1904	0.3884	0.5897	0.7907	0.9848
mean value	0.03727	0.09323	0.19037	0.38833	0.58967	0.79070	0.98480
S.D.(‰)	0.06	0.06	0.06	0.06	0.06	0.1	0.1

Table.S2 The intraday and interday accuracy of DOX tested by UV-vis

Theoretical Concentration (μg/mL)	Intraday			Interday		
	Observed Concentration (μg/mL)		Accuracy (%)	Observed Concentration (μg/mL)		Accuracy (%)
	Mean	S.D.		Mean	S.D.	
10	9.88	0.0029	98.81	9.76	0.1099	97.56
20	19.86	0.0029	99.32	19.61	0.1568	98.07
30	30.02	0.0029	100.06	29.55	0.2389	98.51
40	40.16	0.0050	100.39	39.48	0.3220	98.70

Mean values represent three samples for each concentration

Accuracy=Observed Concentration / Theoretical Concentration × 100%

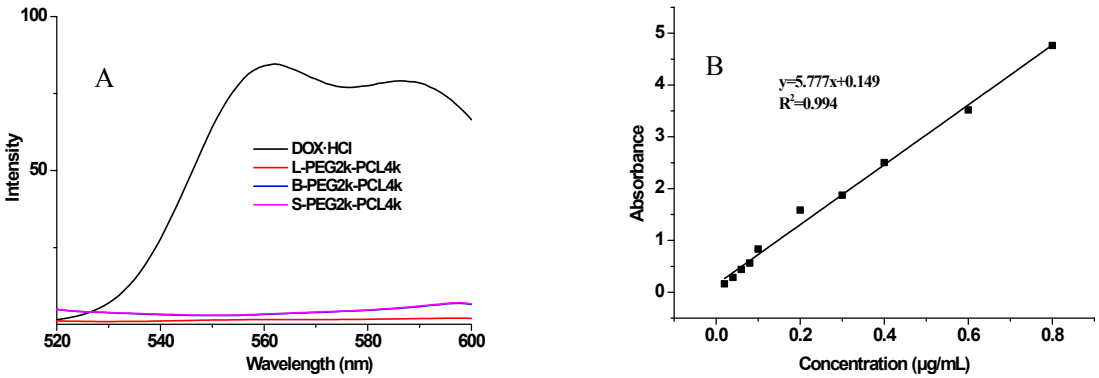
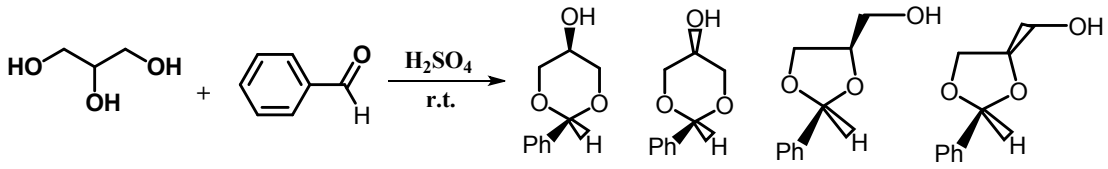


Fig.S2 The full adsorption wavelength spectrum of DOX • HCl and the copolymers (A) and the standard curve of DOX·HCl (B) measured by fluorescence method.

Table.S3 The absorbance of DOX·HCl measured by fluorescence

Concentration（μg/mL）	0.02	0.06	0.1	0.2	0.3	0.4	0.6	0.8
	0.156	0.443	0.838	1.571	1.854	2.509	3.522	4.739
Absorbance	0.158	0.432	0.819	1.574	1.891	2.501	3.510	4.757
	0.166	0.438	0.844	1.605	1.877	2.497	3.516	4.787
mean value	0.1600	0.4377	0.8334	1.5833	1.8740	2.5023	3.5160	4.761
S.D.	0.0053	0.0055	0.0131	0.0188	0.0187	0.0061	0.0060	0.0242



Intermediate 1

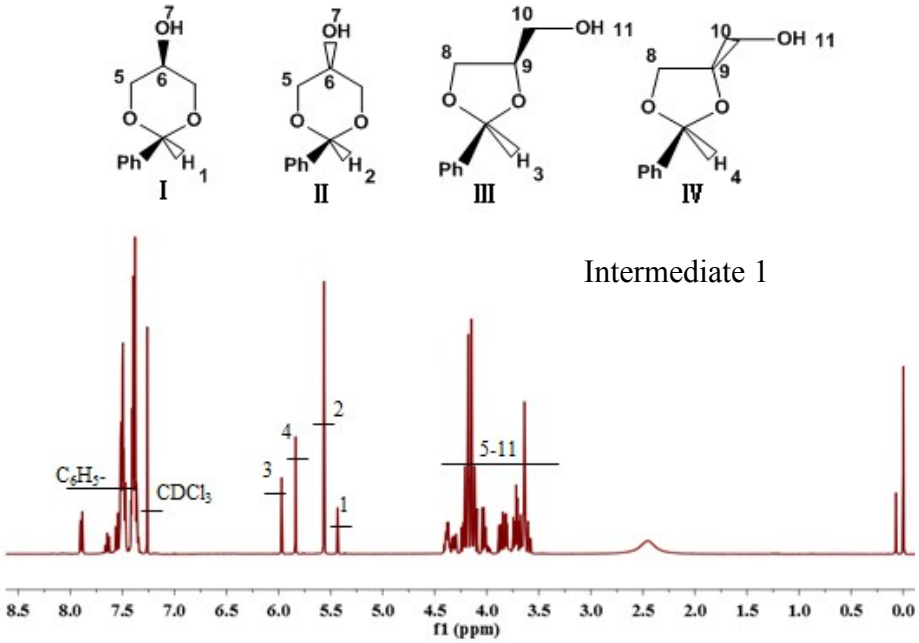


Fig.S3 The ^{1}H NMR spectrum of the Intermediate 1

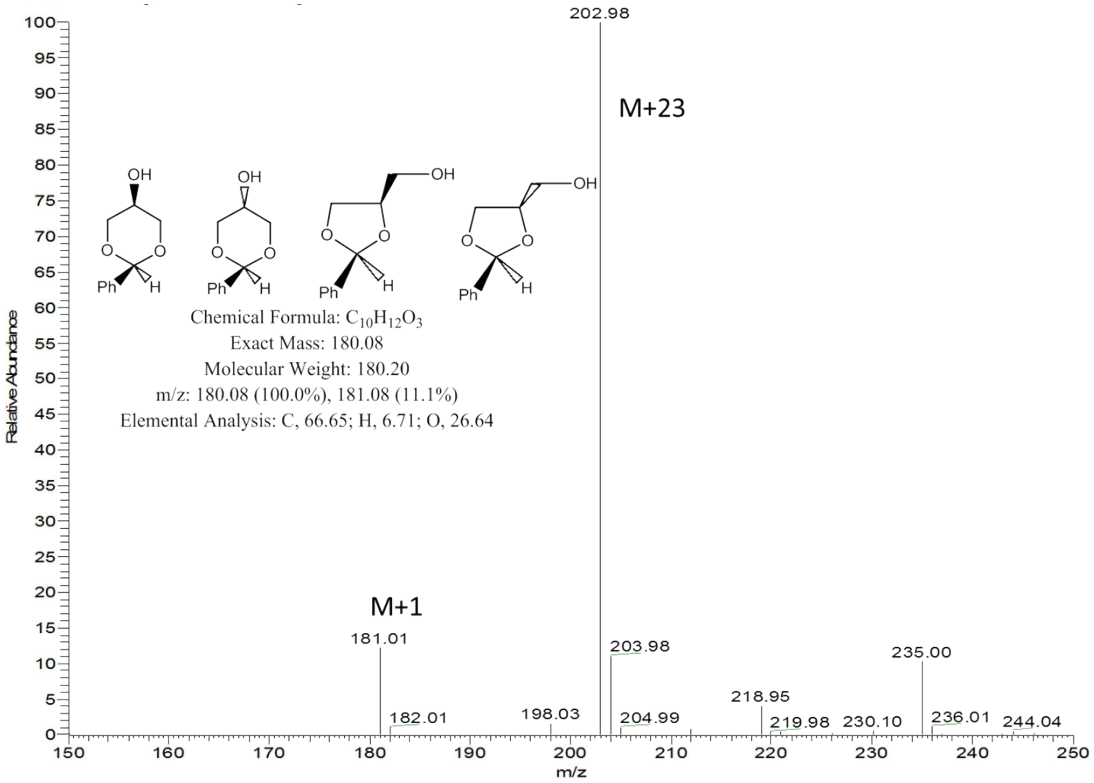


Fig.S4 The +c ESI-MS spectrum of the Intermediate 1.

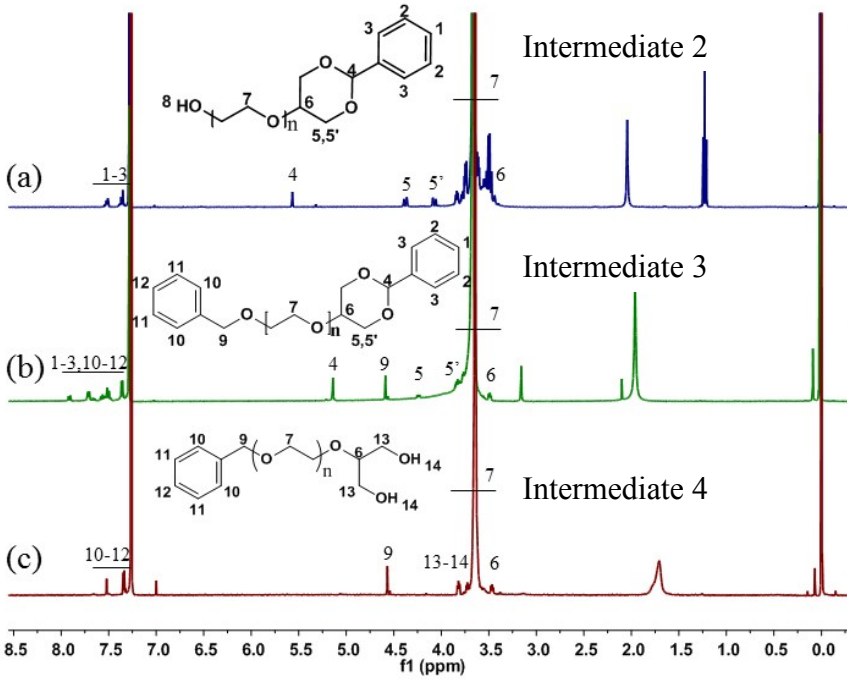


Fig.S5 The ^{1}H NMR spectra (400MHz, $CDCl_3$) of (a) Intermediate 2, (b) Intermediate 3, (c) Intermediate 4.

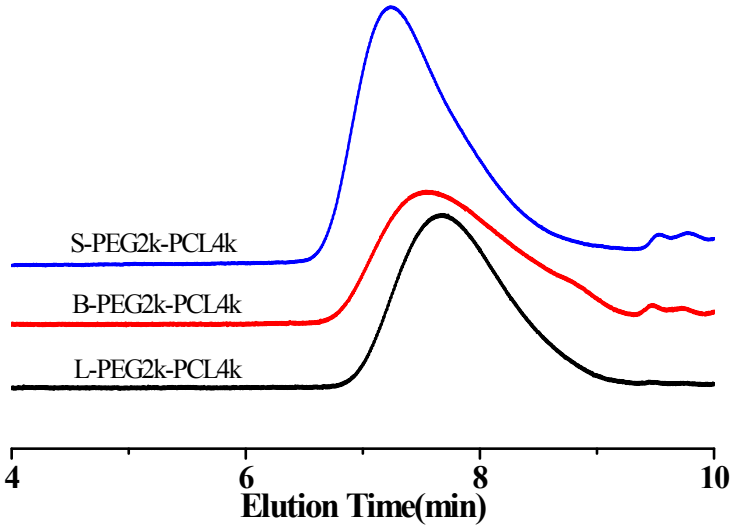


Fig.S6 The GPC spectra of S-PEG2k-PCL4k , B-PEG2k-PCL4k and L-PEG2k-PCL4k.

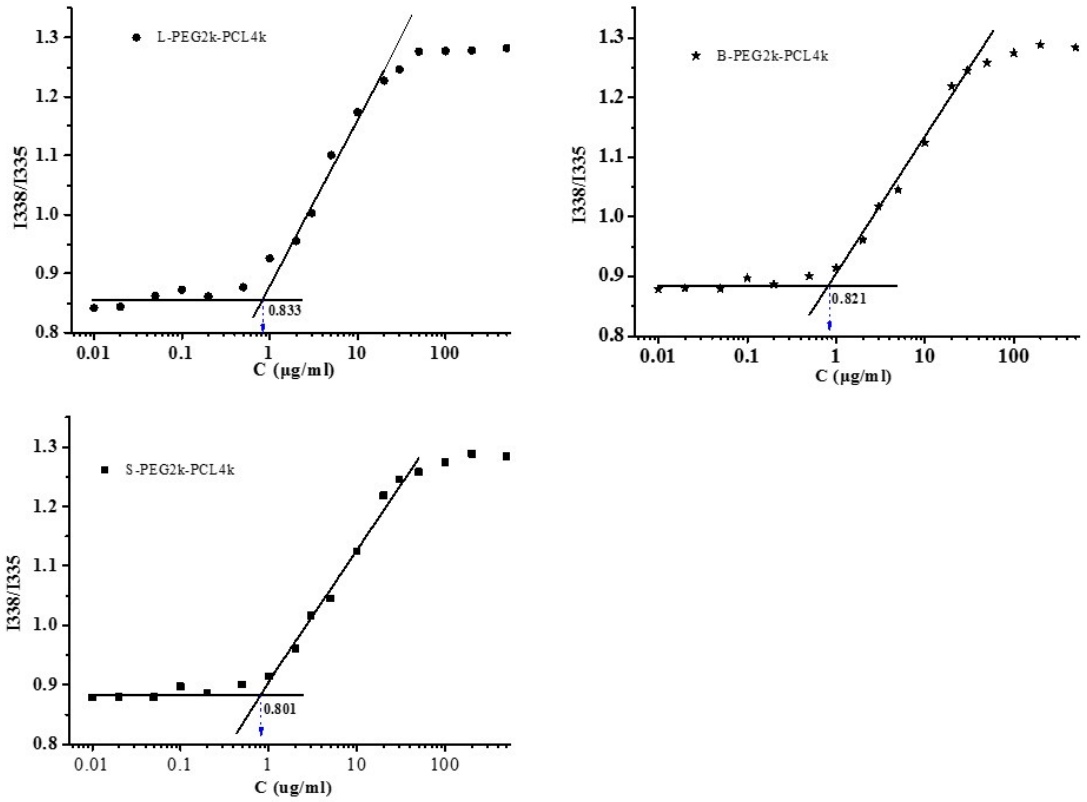


Fig.S7 The critical micelle concentration (CMC) measurement of S-PEG2k-PCL4k, B-PEG2k-PCL4k and L-PEG2k-PCL4k.

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