Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Synthesis of Phospholipid Monolayer Membrane Functionalized Graphene for Drug Delivery

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Supplementary Information:

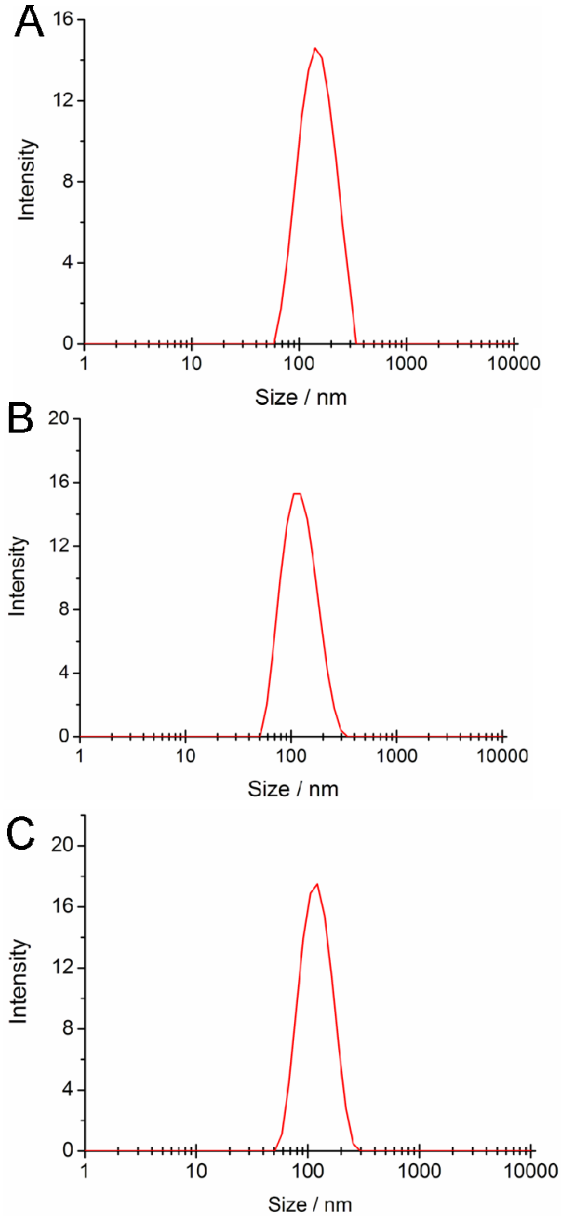


Fig. S1 Size distribution by DLS intensity of (A) DDAB-liposomes, (B) DMPC-liposomes and (C) DMPG-liposomes at 25 °C

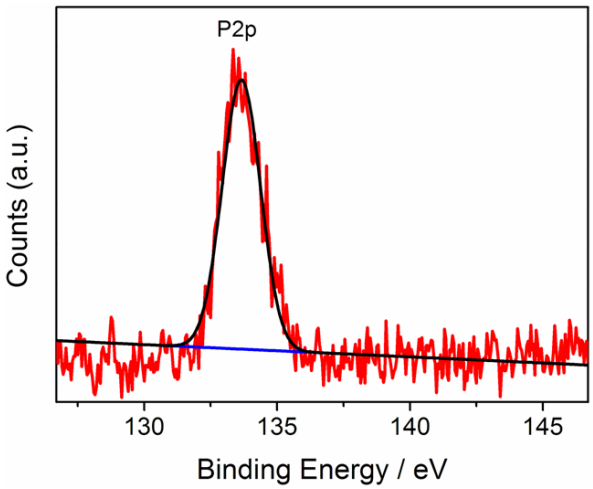
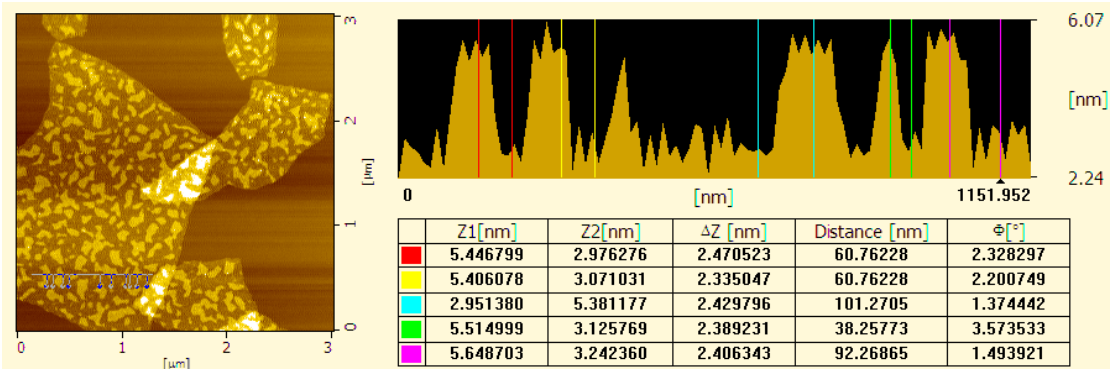


Fig. S2 Phosphorus 2p XPS profile of DMPG-G



	Z1[nm]	Z2[nm]	ΔZ [nm]	Distance [nm]	Φ[°]
	5.446799	2.976276	2.470523	60.76228	2.328297
	5.406078	3.071031	2.335047	60.76228	2.200749
	2.951380	5.381177	2.429796	101.2705	1.374442
	5.514999	3.125769	2.389231	38.25773	3.573533
	5.648703	3.242360	2.406343	92.26865	1.493921

Fig. S3 Tapping mode AFM image of DMPG-G and corresponding height profiles along the line shown in AFM image.

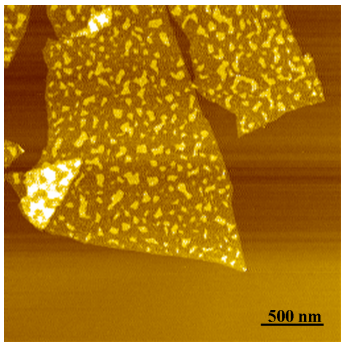


Fig. S4 Tapping mode AFM image of DMPG-G after keeping it in water at 4 □ for two months

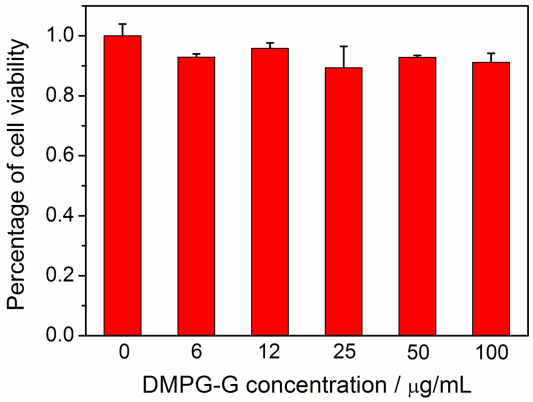
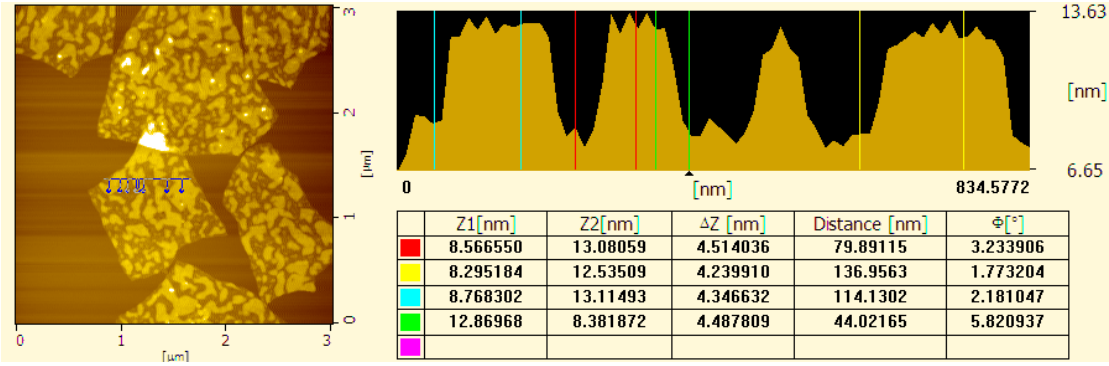


Fig. S5 MTT toxicity assay results for HEK 293 cells exposed to DMPG-G with various concentrations. The viability of the cells untreated with DMPG-G was served as control group and was taken as 100%. Three parallel samples were performed in each group. The final values were expressed as a percentage of the control (mean ± standard deviation).

Human embryonic kidney cells (HEK 293 cells) were chosen for these experiments. The HEK 293 cells (20000 cells/mL) were first plated on a Costar 96-well tissue-culture cluster, and cultured at 37 □ with 5% CO_2 in air overnight to make cells adhere onto the surface. The medium was then changed with 100 μL fresh DMEM (10% FBS) containing different amount of DMPG-G, and the cells were allowed to grow for another 24 h. Cells untreated with DMPG-G were taken as the control group and three parallel samples were performed in each group. After adding 10 μL 3-(4, 5-dimethylthiazolyl-2)-2,5-diphenyltetrazolium bromide (MTT) reagents (5 mg/mL) into each well, the cells were allowed to grow for another 4 h until purple precipitate was visible. The medium was then removed and 100 μL DMSO was added. The cluster was vibrated for 15 min to completely liberate the crystals. Finally, the absorption at 490 nm was measured with an EL808 ultra microplate reader (Bio TEK Instrument Inc).

MTT assays were used to evaluate the viability of the HEK 293 cells after incubation with DMPG-G. As shown in Fig. S5, ~90% cells are still metabolically active even when the concentration of DMPG-G is increased to 100 μg/mL. It indicates that the DMPG-G exhibits no obvious cytotoxicity.



	Z1[nm]	Z2[nm]	ΔZ [nm]	Distance [nm]	Φ[°]
	8.566550	13.08059	4.514036	79.89115	3.233906
	8.295184	12.53509	4.239910	136.9563	1.773204
	8.768302	13.11493	4.346632	114.1302	2.181047
	12.86968	8.381872	4.487809	44.02165	5.820937

Fig. S6 Tapping mode AFM image of DMPG-G-DOX and corresponding height profile along the line shown in AFM image.

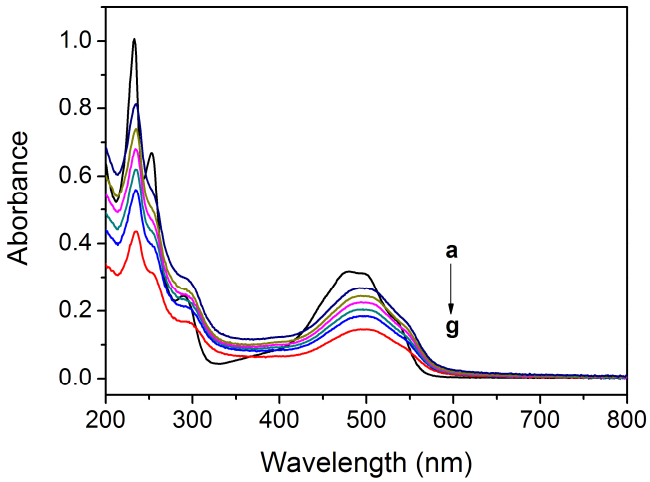


Fig. S7 UV-vis spectra of (a) free DOX dispersion (200 μg/mL), (b-g) DMPG-G-DOX dispersions obtained by incubating DMPG-G in DOX solutions with different initial DOX concentrations of 100, 90, 80, 70, 60, 50 μg/mL, respectively. All solutions were diluted 5 times with water before UV-vis measurements.

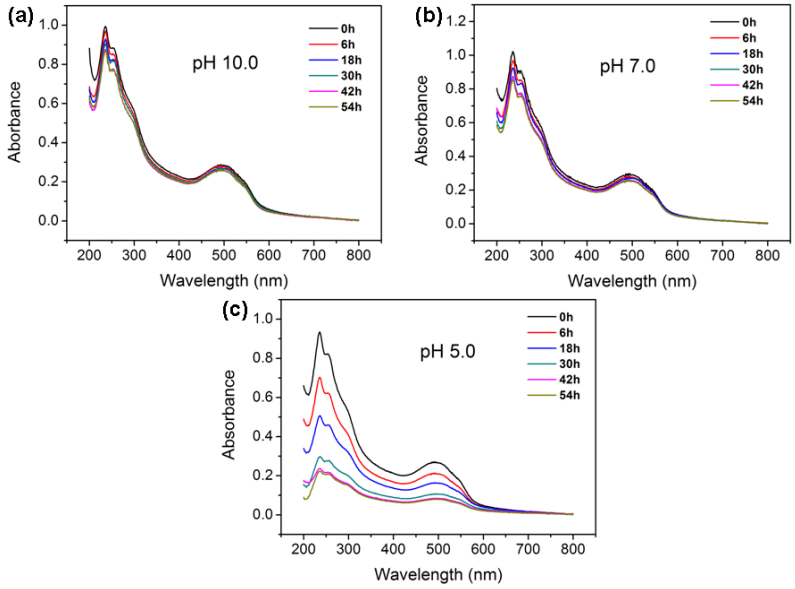


Fig. S8 UV-vis spectra of DMPG-G-DOX before and after incubation in buffers with different pH at 10.0 (a), 7.0 (b) and 5.0 (c) and with different incubation time. Released free DOX was removed thoroughly by filtration.