† Electronic Supporting Information (ESI) for

Antibacterial high-genus polymer vesicle as an "armed" drug carrier

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Calculation of the ratios of hydrated $PMEO_2MA$ / hydrated PTA in branched cylinders and high-genus vesicles

Table S1. The areas of different peaks and the ratios of hydrated $PMEO_2MA$ to hydrated PTA at 20 °C and 37 °C in water.

Spectrum	Temperature	$\mathbf{a}_i$	$\mathbf{a}_{g+h}$	$\mathbf{a}_m$	$\mathbf{a}_{j+d}$	x/y	$PMEO_2MA_x$-*b*-PTA_y	morphology
Fig. S2 in ref[1]	20 °C	60.0	-	40.5	80.56	1.0	x=20, y=20	Free chains
Fig. S1	20 °C	60.0	115.0	20.15	57.62	2.14	x=20, y=9	Branched cylinders
Fig. S2	37 °C	60.0	117.9	52.13	87.05	0.81	x=8, y=9	High-genus vesicles

In Table S1, a_i, a_{g+h}, a_m, a_{j+d} and a_m are areas of peaks i ($PMEO_2MA$, 3x H), g+h ($PMEO_2MA$, 6x H), j+d [$PMEO_2MA$ + PTA, (2x + 2y) H] and m (PTA, 2y H) in Fig. S 1 and Fig. S 2. x and y are the degrees of polymerization of MEO_2MA and TA, respectively.

20°C: We set the integration area of peak i as 60.0. According to separated peaks i ($PMEO_2MA$, 3x H), j+d [$PMEO_2MA$ + PTA, (2x + 2y) H], and m (PTA, 2y H):

Hydrated $PMEO_2MA$ / Hydrated PTA (comparing peak i with peak j+d):

$$\frac{3x}{60} = \frac{2x + 2y}{57.62} \quad \rightarrow \quad x/y = 40/17.62 \approx 2.27$$

Hydrated $PMEO_2MA$ / Hydrated PTA (comparing peak i with peak m):

$$\frac{3x}{60} = \frac{2y}{20.15} \quad \rightarrow \quad x/y = 40/20.15 \approx 2$$

The mean value of $x/y = \frac{2+2.27}{2} \approx 2.14$

$PMEO_2MA$ is hydrated at 20 °C, thus x = 20.

$$\frac{20}{y} = 2.14 \quad \rightarrow \quad y = \frac{20}{2.14} = 9.34 \approx 9$$

Therefore, only ~47% [(9.34/20)*100%=47%] PTA is protonated at 20 ^{o}C.

37^{o}C: We also set the integration area of peak i as 60.0. According to separated peaks i (PMEO$_2$MA, 3x H), and j+d [PMEO$_2$MA + PTA, (2x + 2y) H], and m (PTA, 2y H):

Hydrated PMEO$_2$MA / Hydrated PTA (comparing peak i with peak j+d):

$$\frac{3x}{60} = \frac{2x + 2y}{87.05} \quad \rightarrow \quad x/y = 40/47.05 \approx 0.85$$

Hydrated PMEO$_2$MA / HydratedPTA (comparing peak i with peak m):

$$\frac{3x}{60} = \frac{2y}{52.13} \quad \rightarrow \quad x/y = 40/52.13 \approx 0.77$$

The mean value of $x/y = \frac{0.85+0.77}{2} = 0.81$

Using PTA as the internal standard, $x = 0.81 * 9.34 = 7.57 \approx 8$

This means that only 38% (7.57/20 = 0.38) PMEO$_2$MA is hydrated at 37 ^{o}C, and 62% is dehydrated.

Fig. S 1. ^{1}H NMR spectrum of $PMEO_2MA_{20}$-*b*-PTA_{20} branched cylinders with integrals in D_2O/H_2O at 20 ^{o}C.

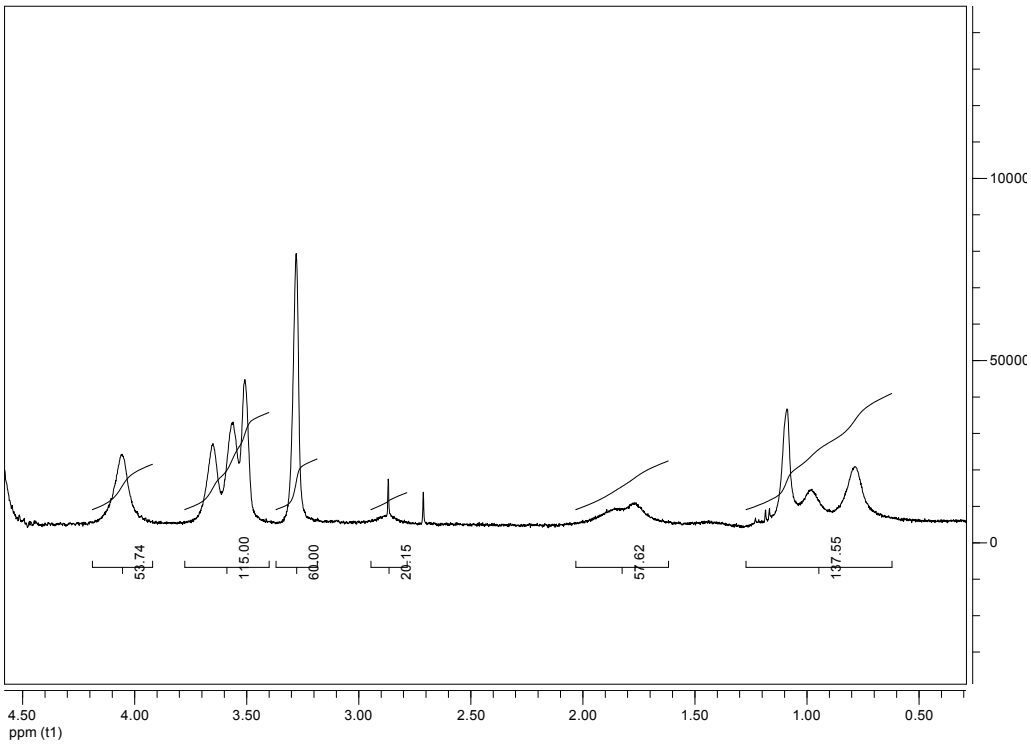


Fig. S 2. ^{1}H NMR spectrum of $PMEO_2MA_{20}$-*b*-PTA_{20} high-genus vesicle with integrals in D_2O/H_2O at 37 ^{o}C.

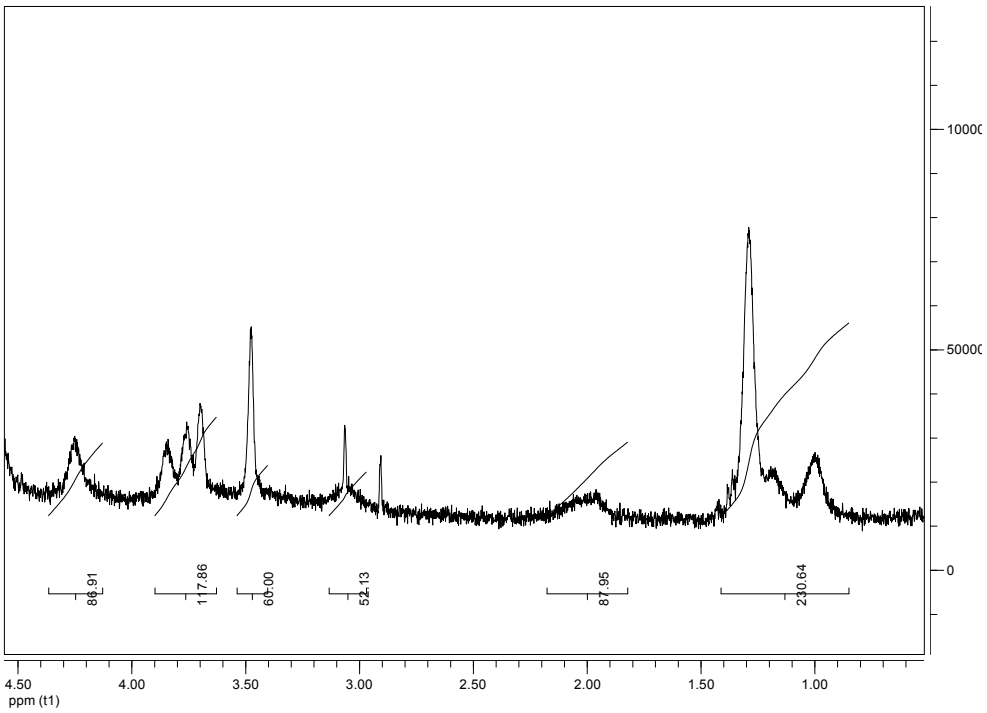
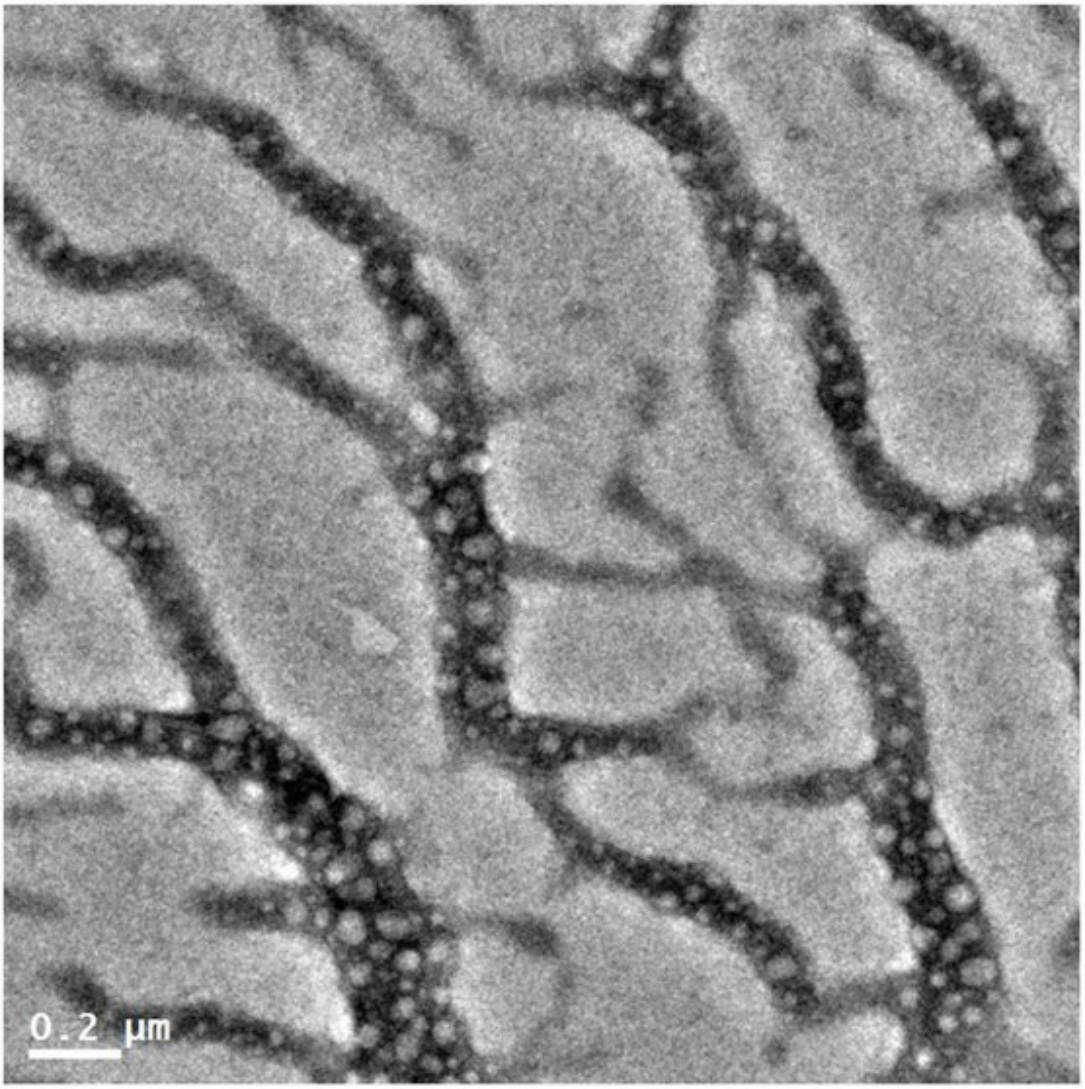


Fig. S 3. More TEM images clearly indicate the $PMEO_2MA_{20}$-*b*-PTA_{20} branched cylinders structure which is composed of small polymer micelles. The stem of the cylinders and the branch of the cylinders have a mean diameter estimated by TEM of 197 ± 40 nm and 92 ± 22 nm, respectively. The diameter of the small micelles is around 52 ± 20 nm.



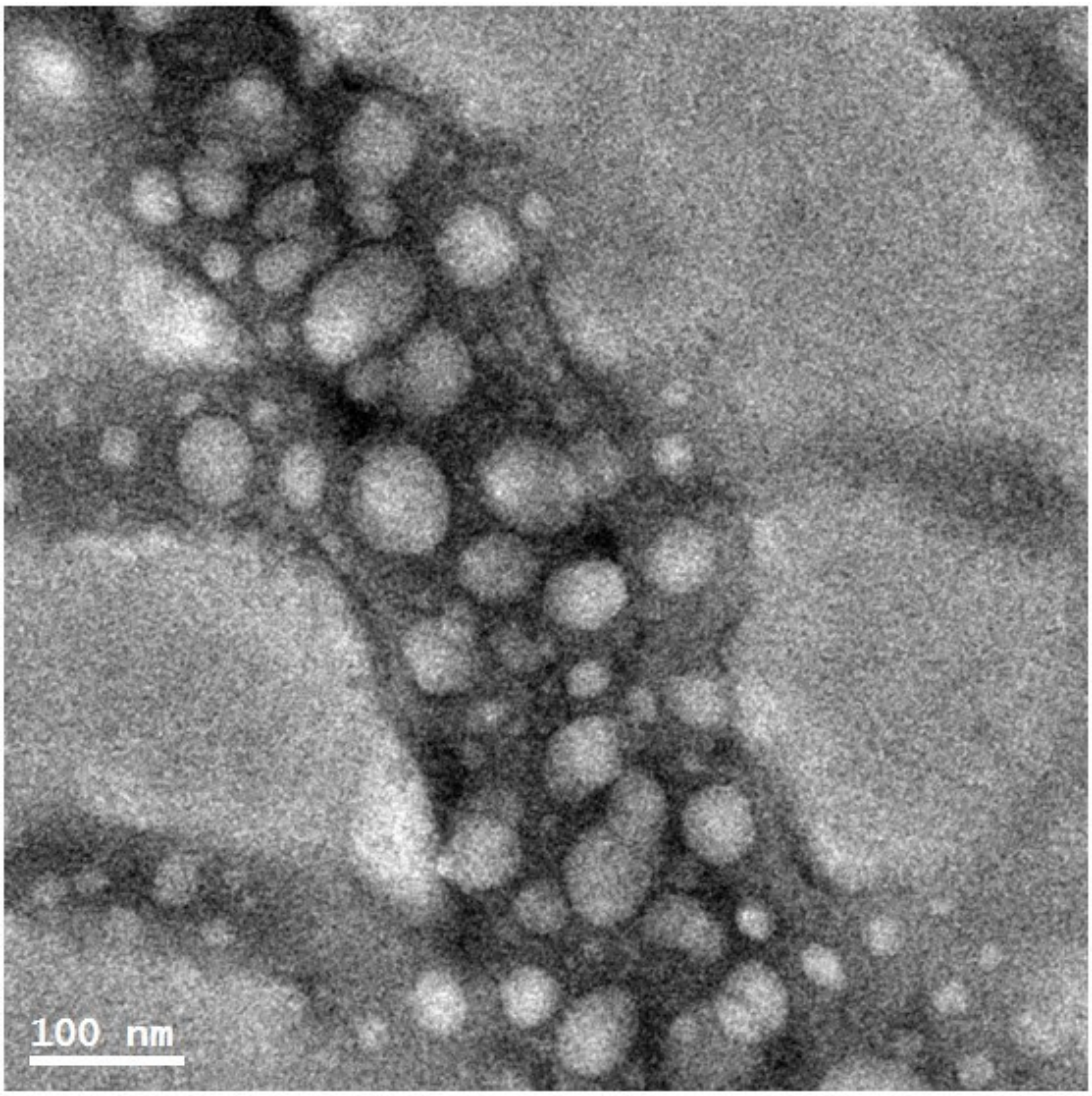
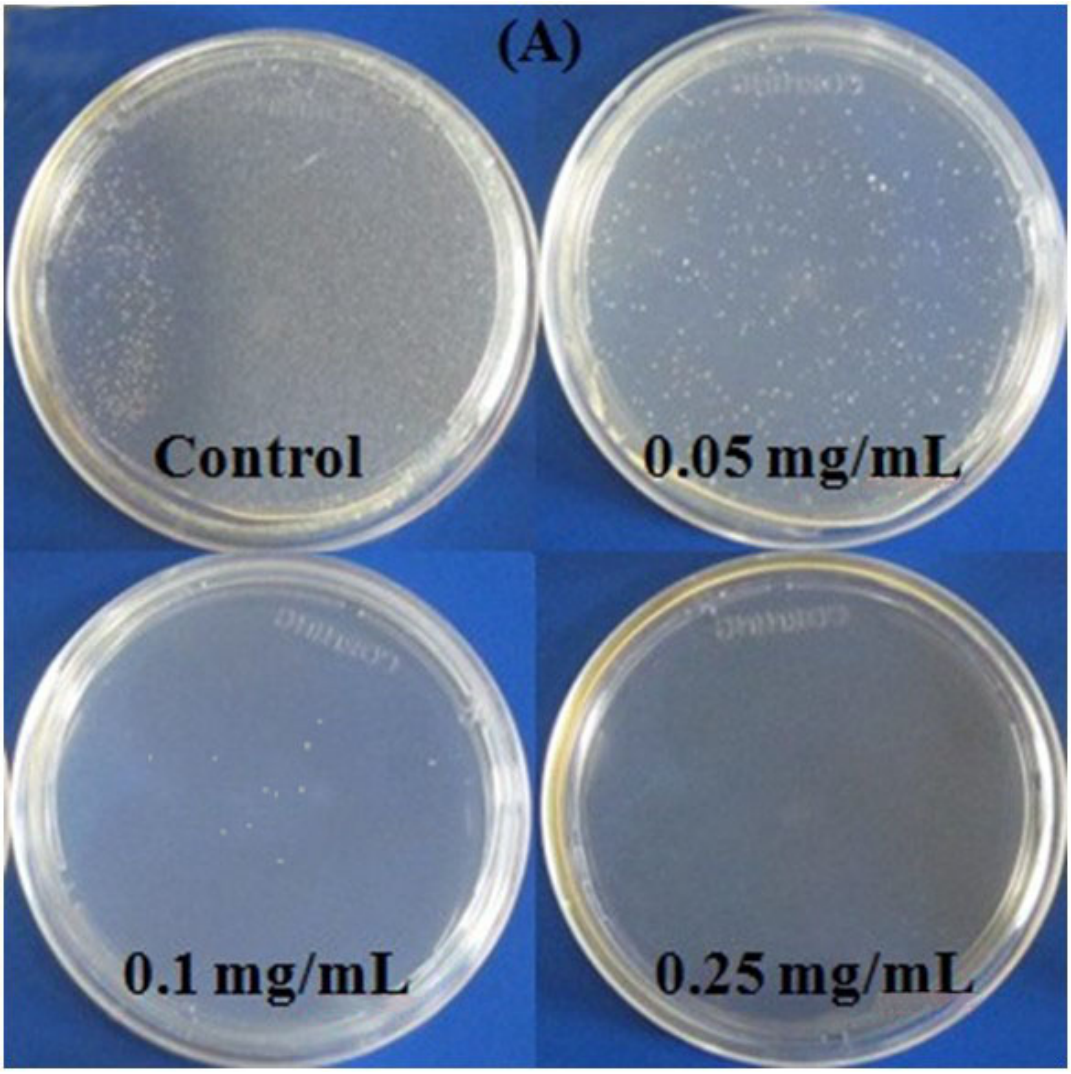
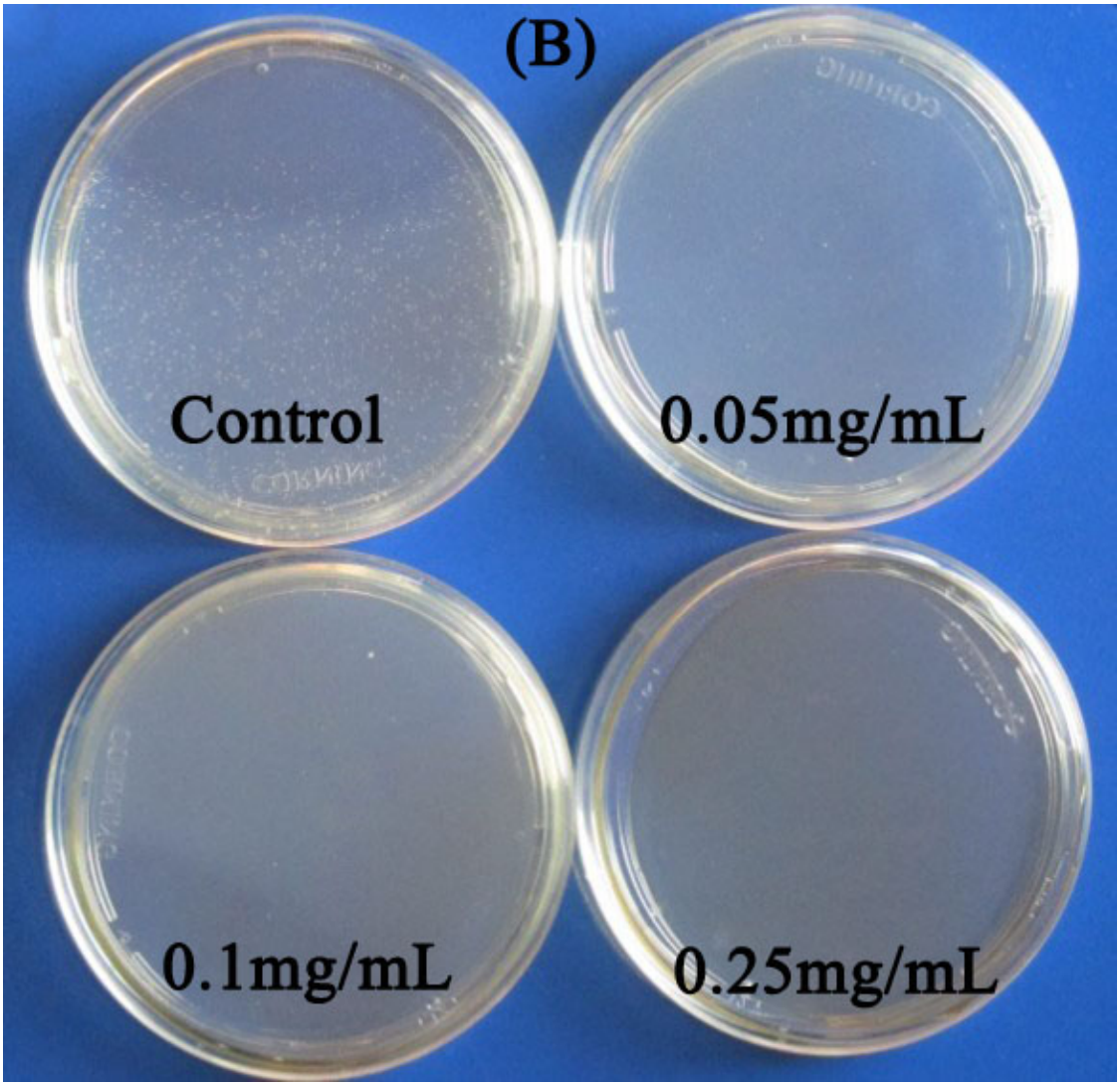


Fig. S 4. The magnified images of Fig. 8: (A) *E. coli.* and (B) *S. aureus.*





Reference:

1. C. Zhang, Y. Q. Zhu, C. C. Zhou, W. Z. Yuan and J. Z. Du, *Polym. Chem.*, 2013, 4, 255-259.