Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Quaternized polymer-based nanostructures confer antimicrobial efficacy against multidrug-resistant bacteria

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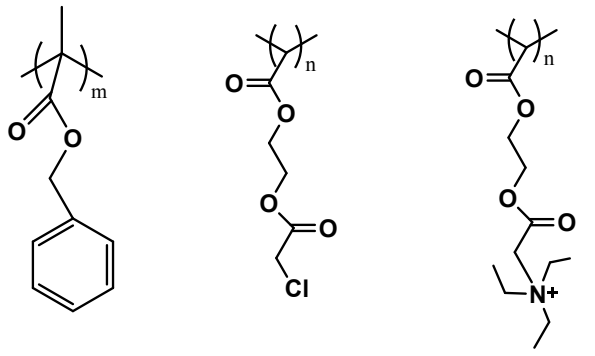

PBMA PECA PECAN

Fig. S1 The chemical structures of PBMA, PECA and PECAN

Proton Nuclear Magnetic Resonance (^{1}H NMR).

The NMR spectra were recorded on a Bruker AV 600 MHz spectrometer, using tetramethylsilane as an internal standard and DMSO-d6.

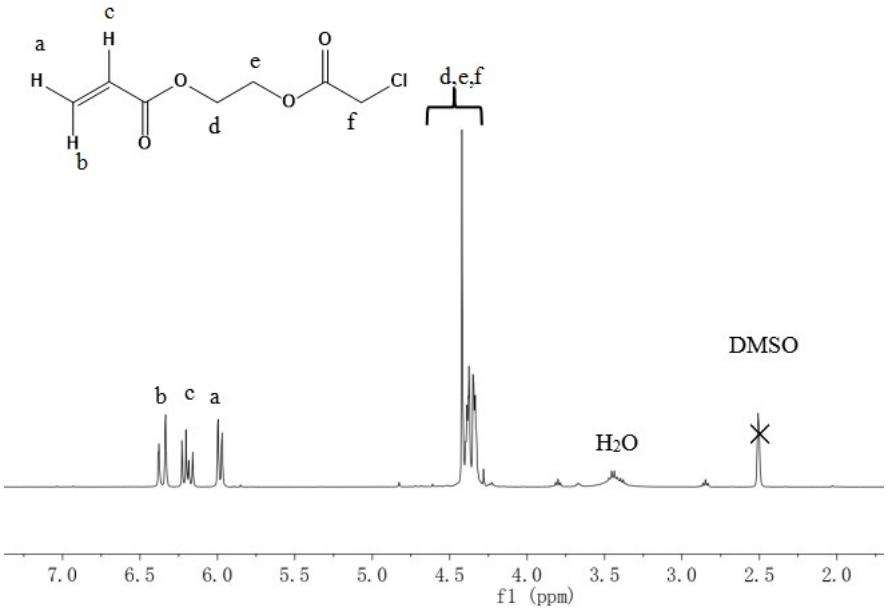

Fig. S2 ^{1}H NMR spectrum of ECA in DMSO-d_6

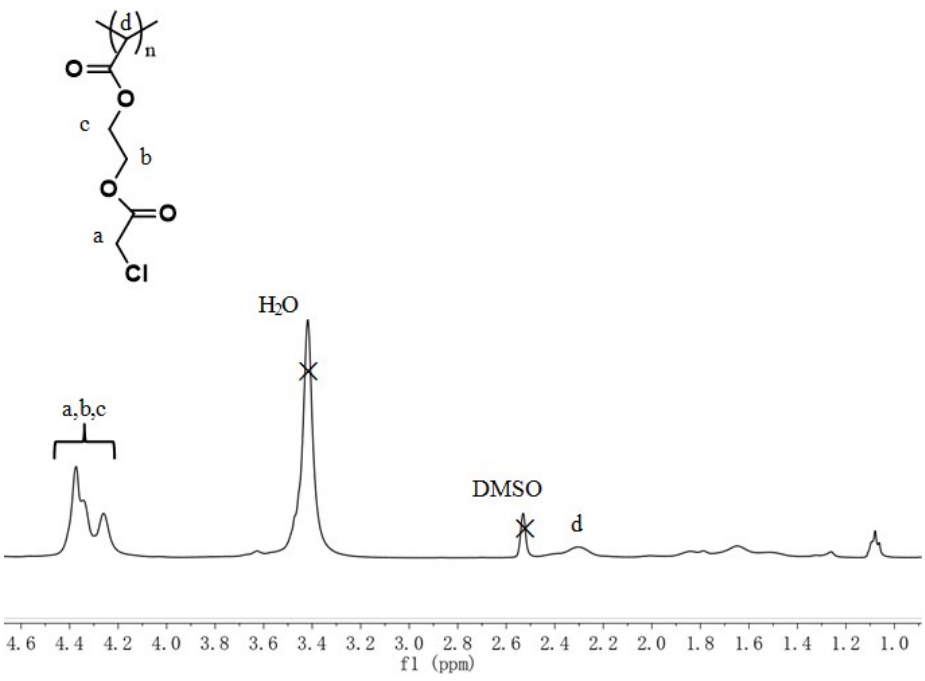

Fig. S3 ^{1}H NMR spectrum of PECA in DMSO-d

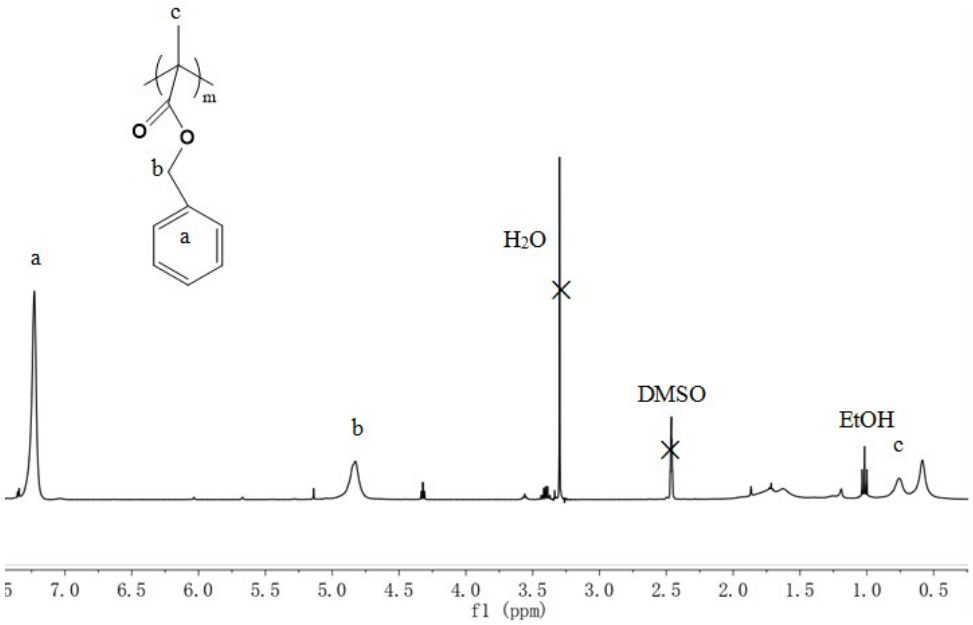

Fig. S4 ^{1}H NMR spectrum of PBMA in DMSO-d_6

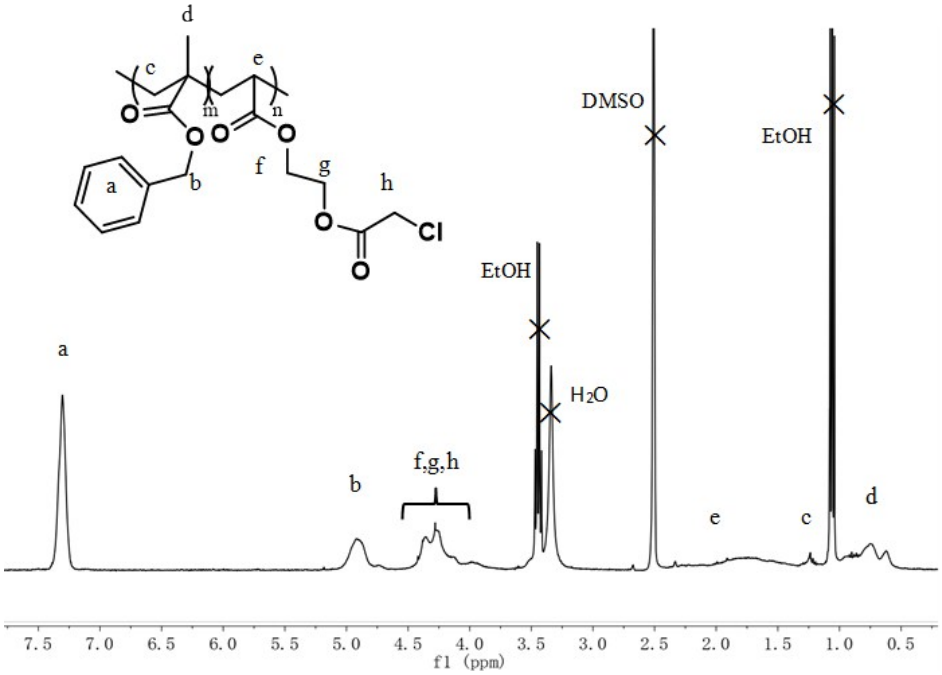

Fig. S5 ^{1}H NMR spectrum of PEB1 (m/n=1.2:1) in DMSO-d_6

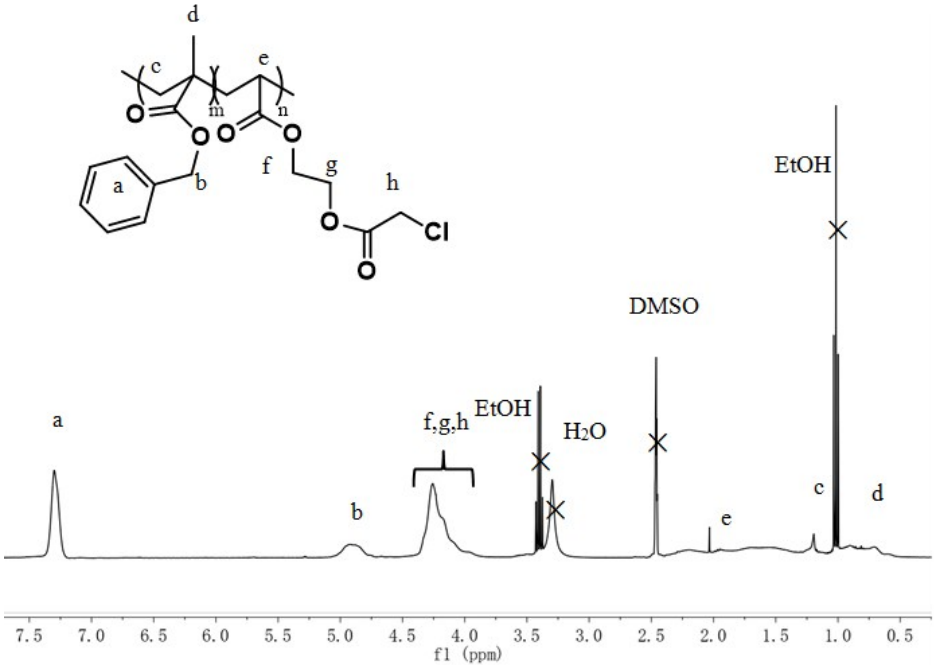

Fig. S6 ^{1}H NMR spectrum of PEB2 (m/n=1:1.7) in DMSO-d_6

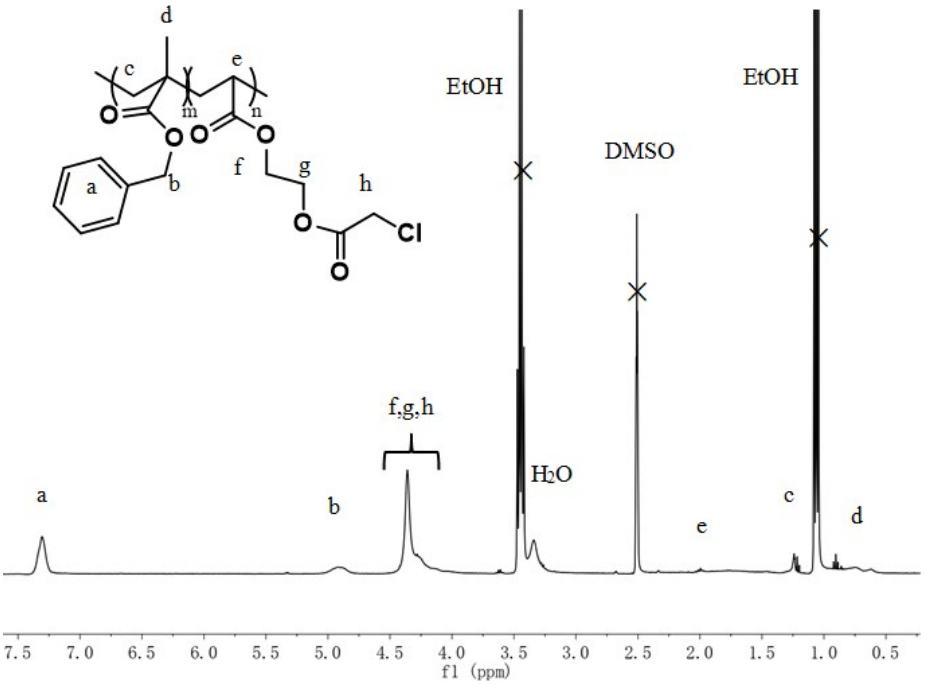

Fig. S7 ^{1}H NMR spectrum of PEB3 (m/n=1:2.3) in DMSO-d_6

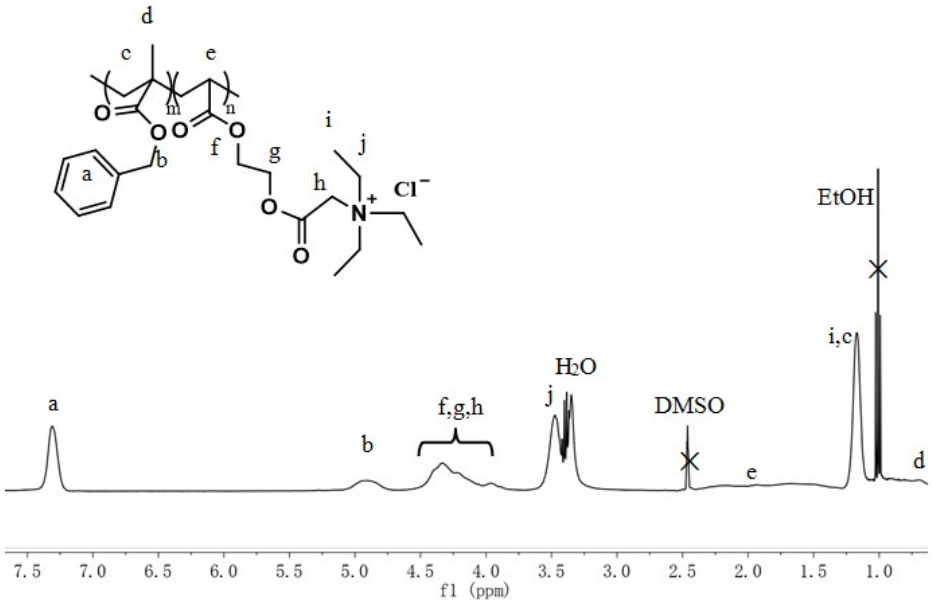

Fig. S8 ^{1}H NMR spectrum of **N1** (m/n=1:1.2) in DMSO-d_6

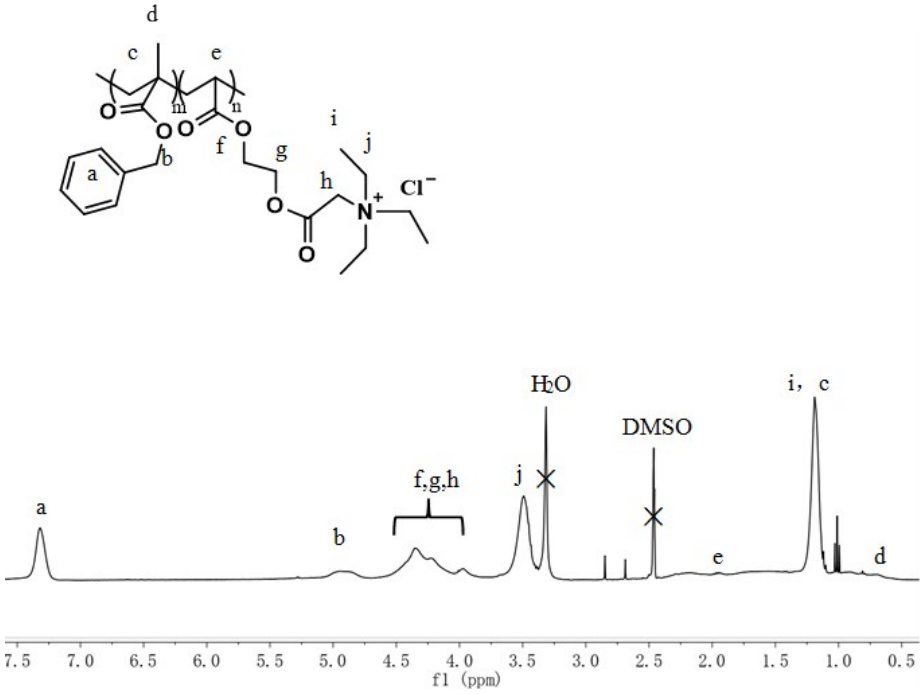

Fig. S9 ^{1}H NMR spectrum of **N2** (m/n=1:1.6) in DMSO-d_6

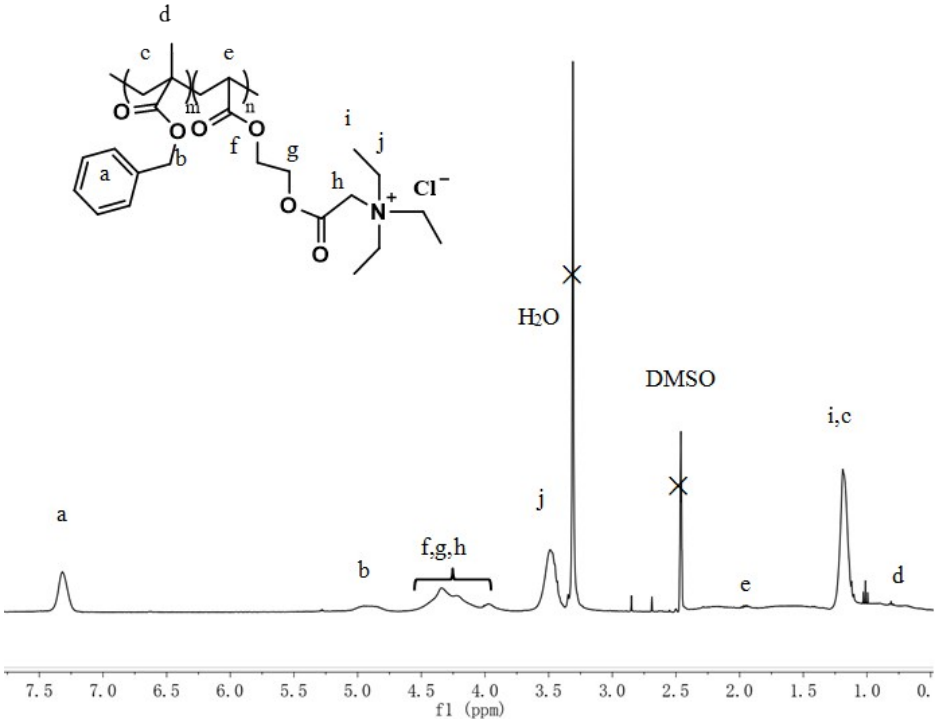

Fig. S10 ^{1}H NMR spectrum of **N3** (m/n=1:2) in DMSO-d_6

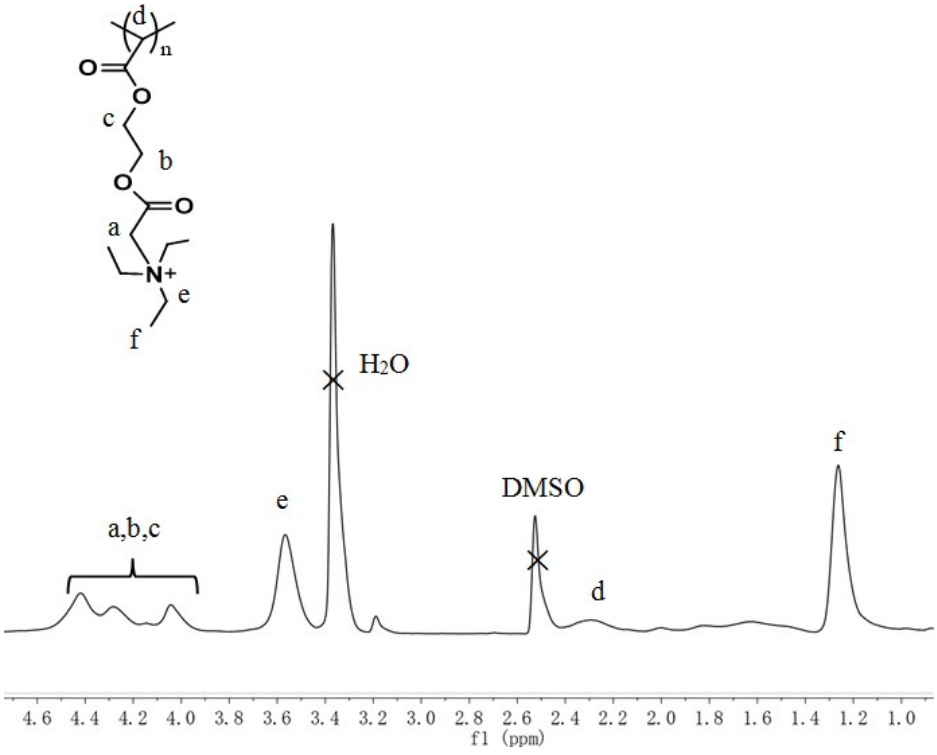

Fig. S11 ^{1}H NMR spectrum of **N4** in DMSO-d_6

Gel permeation chromatography (GPC)

The molecular weight and polydispersity index of polymers were determined on a gel permeation chromatography (GPC) instrument equipped with two Plgel 5 mm Mixed-D column. DMF was used the eluent with a flow rate of 1 mL/min, and the polystyrene as standard was used for column calibration. The polymers was centrifuged and filtered prior to experiments.

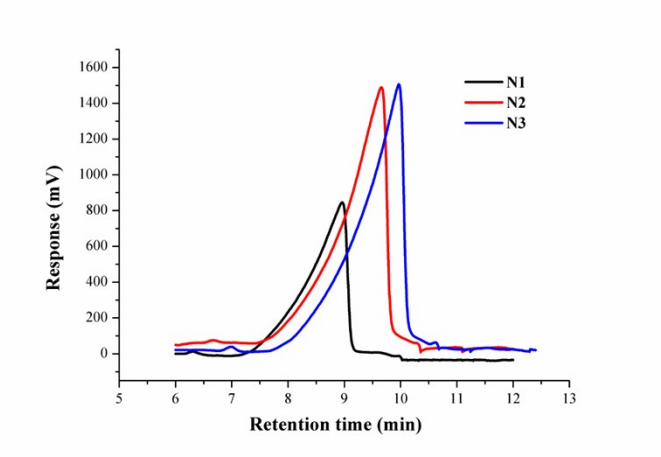

Fig. S12 The GPC trace of **N1**, **N2** and **N3**

Table S1 The GPC value of **N1**, **N2** and **N3** in DMF

PEMN	**N1**	**N2**	**N3**
MW	12455	7282	7100

Formulation of M9 medium

$MgSO_4$ (1M), $CaCl_2$ (1M) and $ZnSO_4$ (1M) were dissolved in double distilled water (10 mL), respectively, and autoclaved for later use. 5 × M9 salt solution, including $Na_2PO_4 \cdot 7H_2O$, KH_2PO_4, NaCl and NH_4Cl, was prepared and dissolved in 200ml of double distilled water and sterilized at 121 ° C for 15 minutes. Then a 20% glucose solution was prepared with sterilized at 115 ° C for 15 minutes.

Aseptic preparation of M9 medium (1000 mL): 5 × M9 salt solution (200 mL), 1M $MgSO_4$ (2 mL)，1M $CaCl_2$ (0.1 mL), 1M $ZnSO_4$ (0.1 mL) and 20% glucose solution (20 mL) was mixed, and the sterilized double distilled water was added to the mixture to achieve a total volume of 1000 ml.

Scanning electron microscopy (SEM)

The morphologies of the nanoparticles and microorganisms before and after treatment with nanoparticles were observed using a field emission SEM (SU8010) operated at an accelerating voltage of 3.0 keV. Samples were treated with gold before observation.

Dynamic light scattering apparatus (DLS) Study

Measurement of particle size Distribution Polymer Micellar solution was carried out by dynamic light scattering apparatus (DLS) on a Malvern Zetasizer Nano-ZS at a fixed scattering angle of 90°. Measured with polymer concentration of 1 mg/mL for sample preparation.

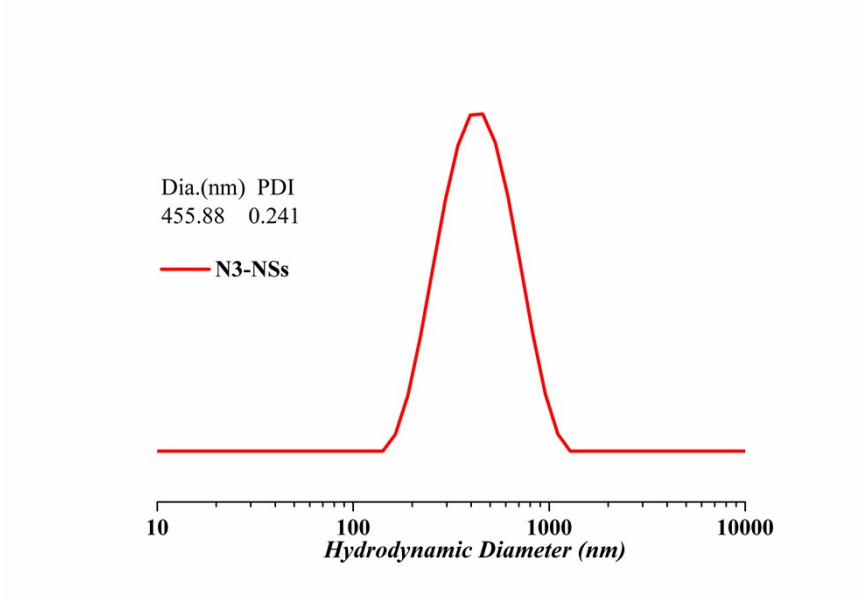

Fig. S13 DLS studies of **N3-NSs** (by intensity) in water.

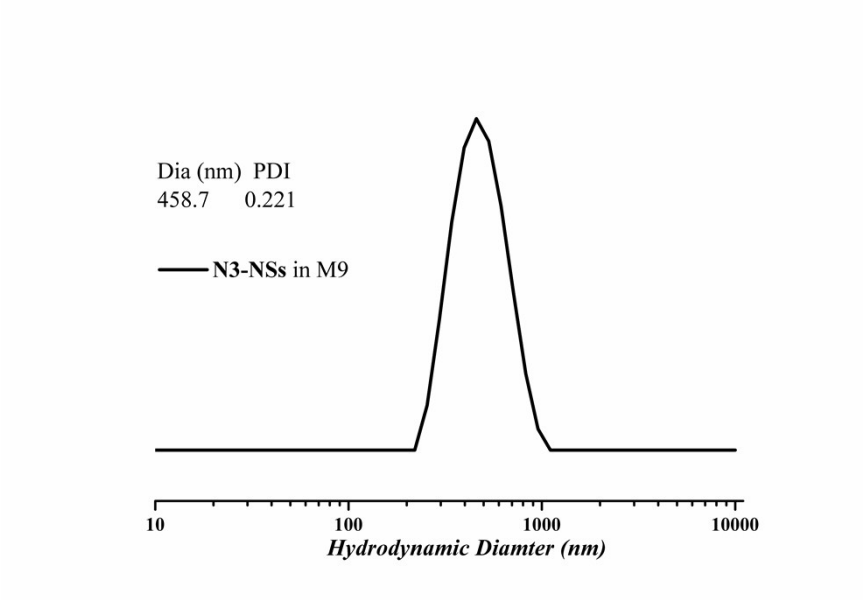

Fig. S14 DLS studies of **N3-NSs** (by intensity) in M9.

Zeta potential

Zeta potential studies was measured on a Water Nano-ZS 90 Nanosizer (Malvern Instrument) at a fixed scattering angle of 90° at room temperature.

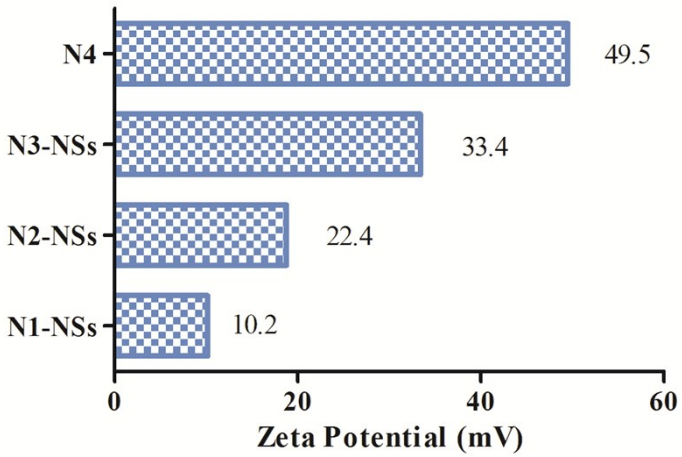

Fig. S15 Zeta potential of **NSs** and **N4** in water solution at room temperature.