# *Electronic Supplementary Information*

## Smart nanomicelles with bacterial infection-responsive disassembly for selective antimicrobial applications

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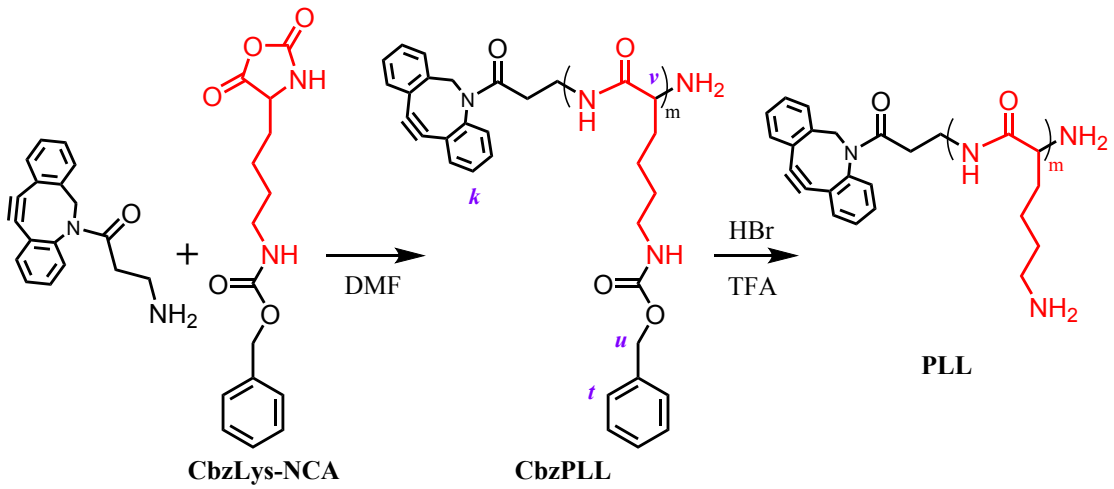


**Figure S1.** Ring-opening polymerization of CbzLys-NCA and subsequent deprotection to obtain 'clickable' cyclooctyne-terminated PLL.

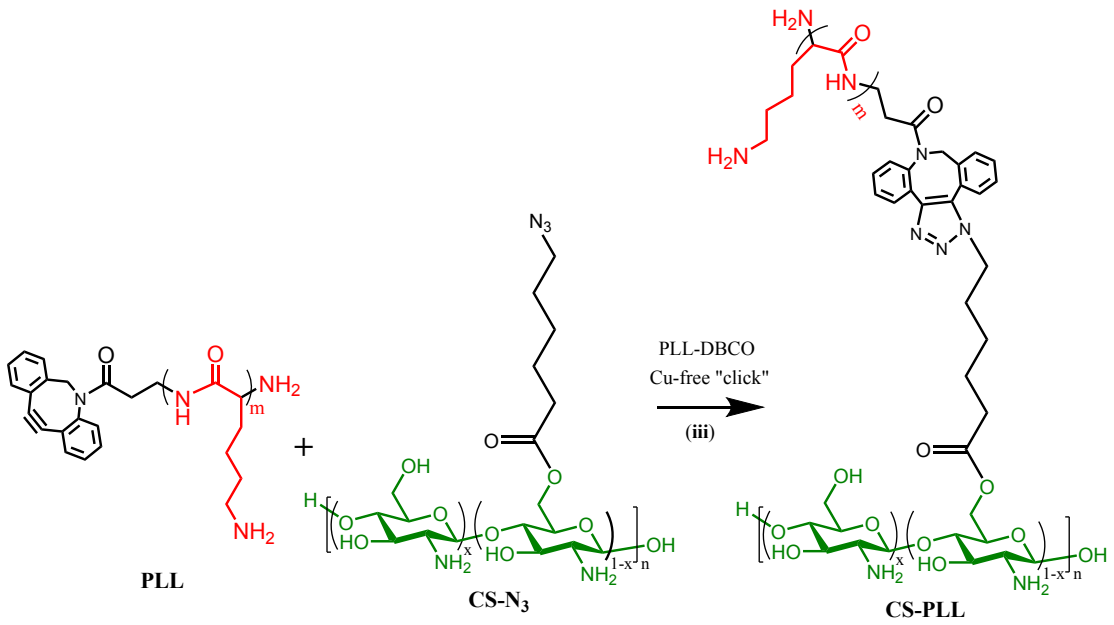


**Figure S2.** Strain-promoted azide-alkyne cycloaddition between cyclooctyne-terminated PLL and CS-$N_3$ to obtain CS-PLL conjugate.

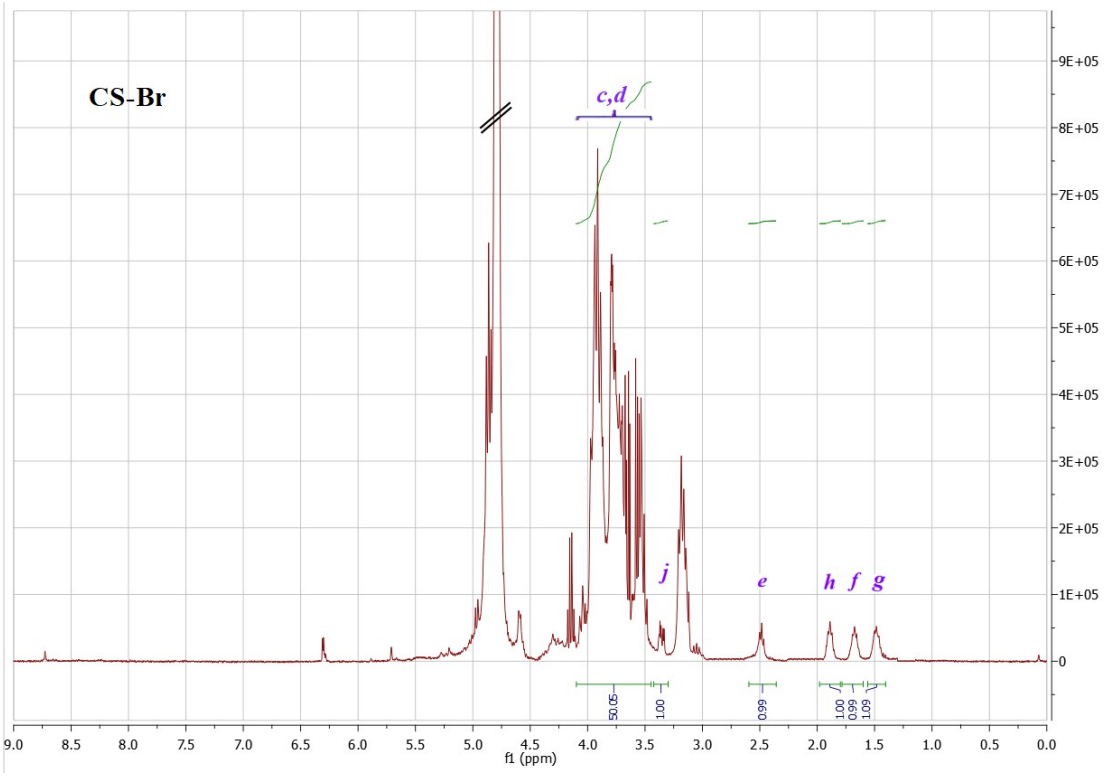


**Figure S3.** Peak integration ratio on the $^{1}H$ NMR spectra of the CS-Br.

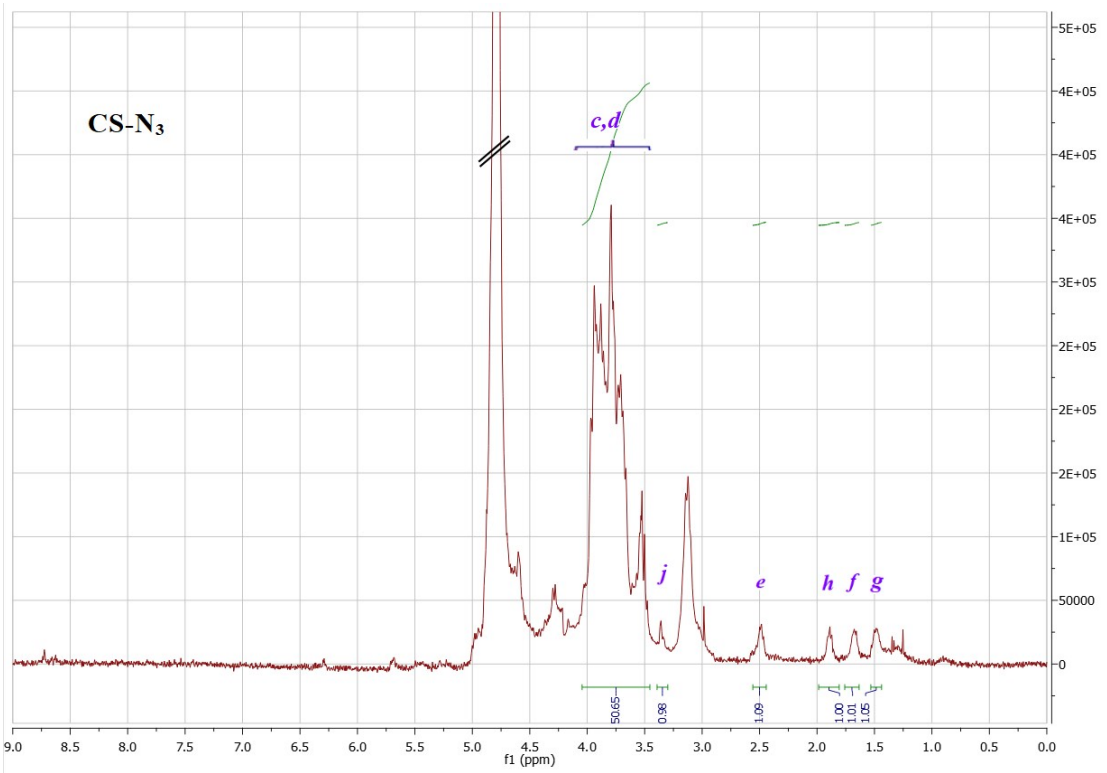


**Figure S4.** Peak integration ratio on the $^{1}H$ NMR spectra of the CS-$N_3$.

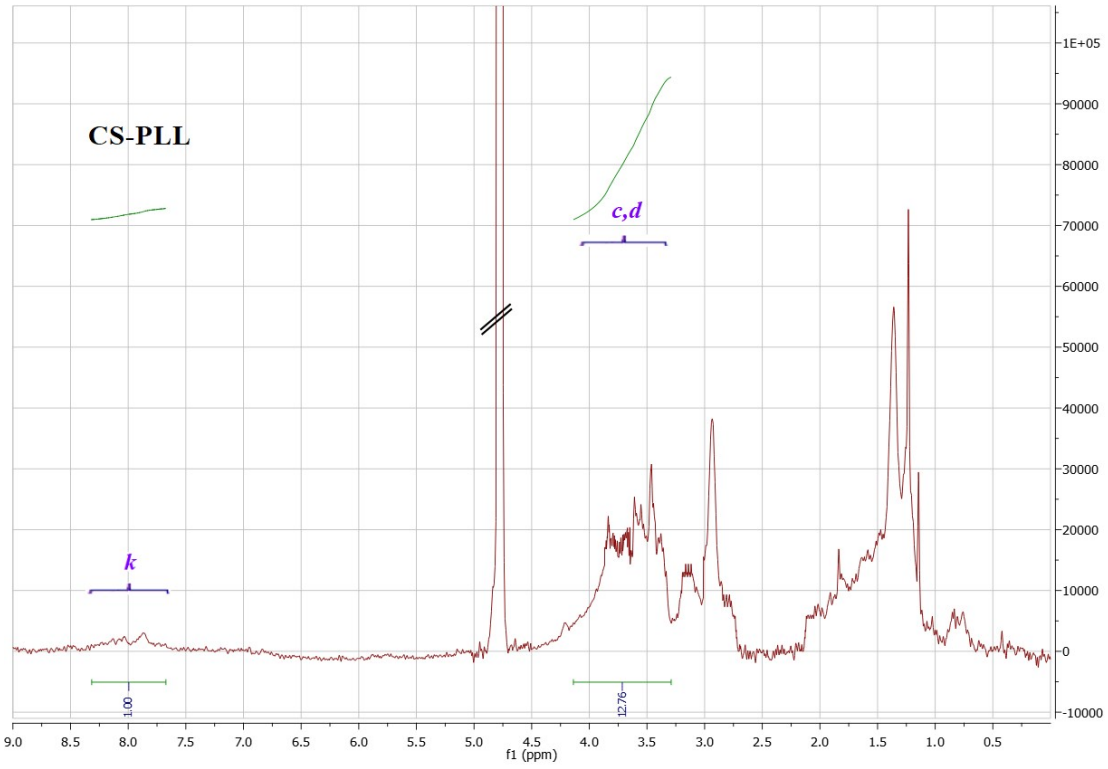


**Figure S5.** Peak integration ratio on the $^{1}$H NMR spectra of the CS-PLL.

**Calculations for degree of modification of the chitosan derivatives**

CS-Br

$$= \frac{1}{50.05} \div \frac{2}{5} = 0.04995$$

CS-$N_3$

$$= \frac{1}{50.65} \div \frac{2}{5} = 0.04936$$

CS-PLL

$$= \frac{1}{12.76} \div \frac{8}{5} = 0.04898$$

**Table S1.** Molecular weight and polydispersity index of the functionalized chitosan and chitosan-polylysine, and percentage modification of the chitosan derivatives.

| Sample | $M_w$ [a] (g/mol) | $M_n$ [a] (g/mol) | $M_w/M_n$ [a] | Modification degree of CS [b] |
|---|---|---|---|---|
| CS | 3,572 | 2,251 | 1.58 | - |
| CS-Br | 3,791 | 2,384 | 1.59 | 5% |
| CS-$N_3$ | 3,621 | 2,270 | 1.60 | 5% |
| CS-PLL | 8,763 | 4,596 | 1.90 | 5% |

[a] Molecular weight and polydispersity index were determined from GPC analysis.

[b] Modification degree was determined from peak integration ratio of $^1$H NMR spectra.

**Table S2.** Zeta potential values and particle diameters of the polymers and nanomicelles.

| Sample | Particle diameter [a] (nm) | | Zeta potential, ζ (mV) |
|---|---|---|---|
| | TEM | DLS | |
| PLL | - | - | 30.8 ± 3.2 |
| CS-PLL | - | - | 30.3 ± 4.1 |
| CS-PLL-CA | - | - | -23.2 ± 4.9 |
| CS-PLL/CA NMs, pH 7.4 | 55.2 ± 3.7 | 76.4 ± 7.1 | 21.4 ± 5.2 |
| CS-PLL/CA NMs, pH 5.0 | 35.1 ± 25.3 | 22.9 ± 9.5 | 29.7 ± 6.2 |

[a] Dry-state and hydrodynamic diameters of the NCs were determined from TEM image and DLS measurement, respectively.

**Table S3.** Bactericidal activity of the PLL, CS-PLL, CS-PLL-CA, CS-PLL/CA NMs at pH 7.4, and CS-PLL/CA NMs at pH 5.0.

| Sample | MBC, $\mu$g/mL | | | | |
|---|---|---|---|---|---|
| | *E. coli* | *P. aeruginosa* | *S. aureus* | *S. epidermidis* | *MRSA* |
| PLL | 32 | 64 | 32 | 16 | 32 |
| CS-PLL | 64 | 128 | 64 | 16 | 64 |
| CS-PLL-CA | > 1024[a] | > 1024[a] | > 1024[a] | > 1024[a] | > 1024[a] |
| CS-PLL/CA NMs, pH 7.4 | > 1024[a] | > 1024[a] | > 1024[a] | > 1024[a] | > 1024[a] |
| CS-PLL/CA NMs, pH 5.0 | 64 | 128 | 64 | 16 | 64 |

[a] The values were not observed up to the highest concentrations of compound tested (1024 $\mu$g/mL).