Supporting Information

Phosphonate/zwitterionic/cationic terpolymer as high-efficiency bactericidal and antifouling coating for metallic substrates

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Experimental

Preparation of phosphonate/zwitterionic/cationic terpolymers

By calculating the ratio of the integral area of H at position "1" in pDEMMP to the integral area of H in the benzene ring in CTA, the actual DP of pDEMMP was obtained. The peak area of H corresponding to position "5" in pDEMMP-*b*-p(SBMA-*co*-DMAEMA) was taken as reference for normalization calculation, and the ratio of the peak area of H corresponding to -CH_3 at position "2, 7, 12" to the peak area of H corresponding to -$N(CH_3)_2$ at position "15" was obtained. Combining with the degree of polymerization of pDEMMP, the actual molar ratio of SBMA to DMAEMA content was obtained.

Result and Discussion

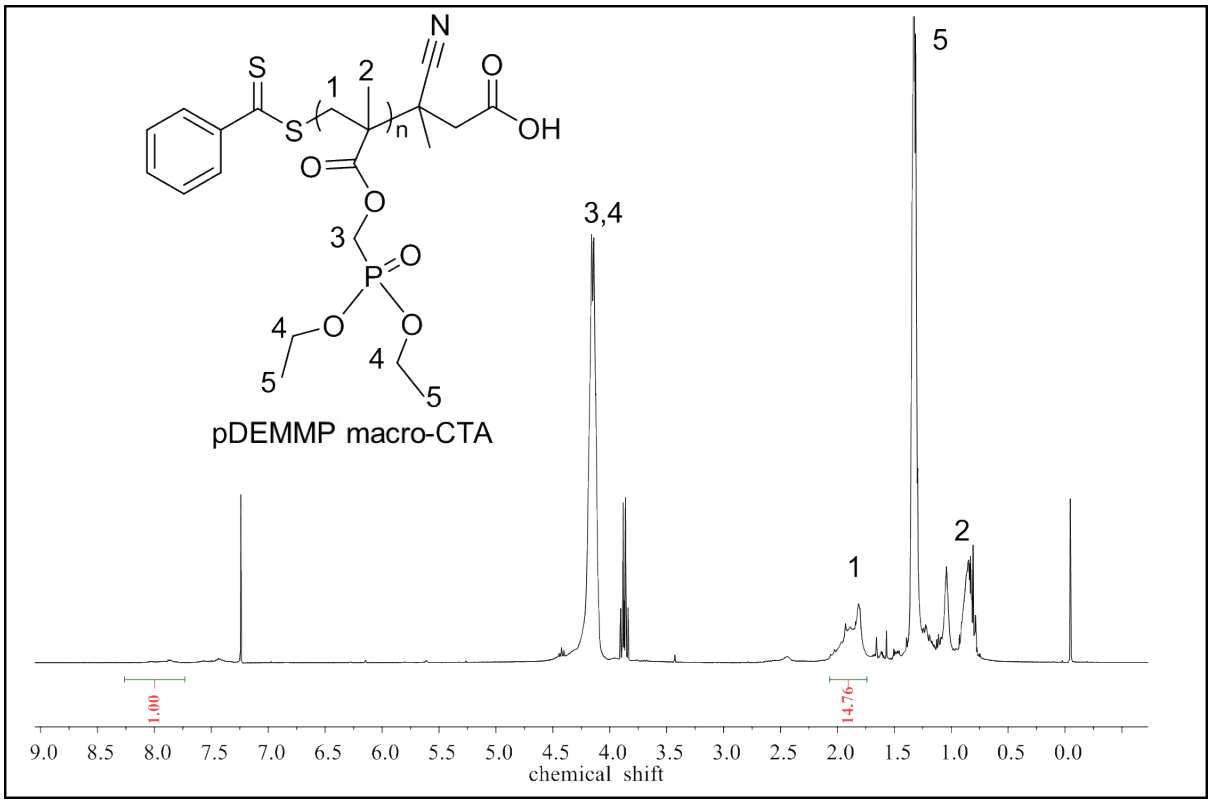

Fig. S1 ^{1}H NMR spectrum of pDEMMP macro–CTA.

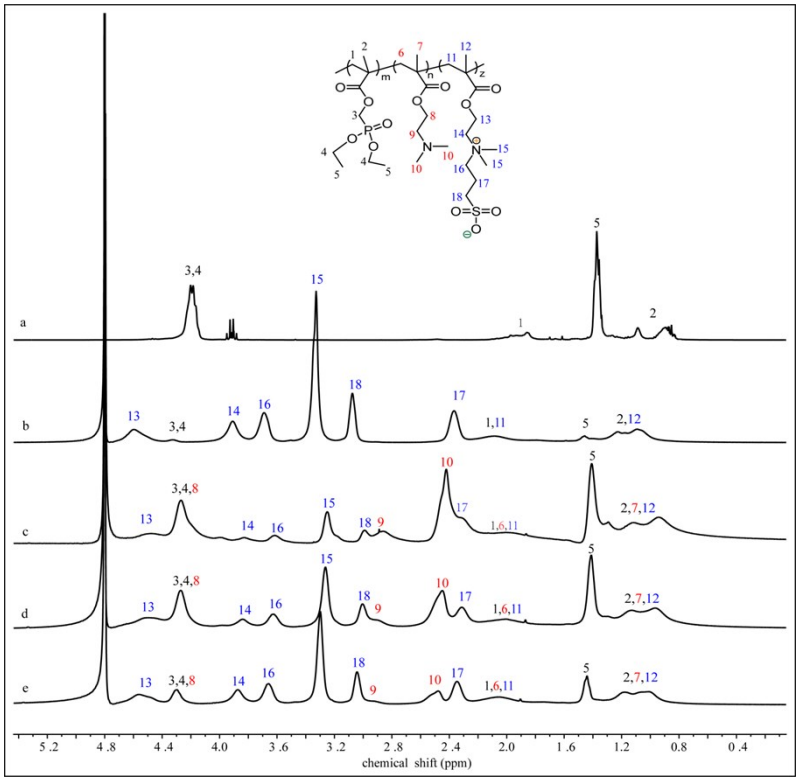

Fig. S2 ^{1}H NMR spectra of pDEMMP, pDEMMP-*b*-pSBMA, and pDEMMP-*b*-p(SBMA-*co*-DMAEMA). (a) pDEMMP, (b) pDEMMP$_{15}$-*b*-pSBMA$_{64}$, (c) pDEMMP$_{15}$-*b*-p(SBMA-*co*-DMAEMA) (54 : 18), (d) pDEMMP$_{15}$-*b*-p(SBMA-*co*-DMAEMA) (18 : 32), and (e) pDEMMP$_{15}$-*b*-p(SBMA-*co*-DMAEMA) (9 : 52).

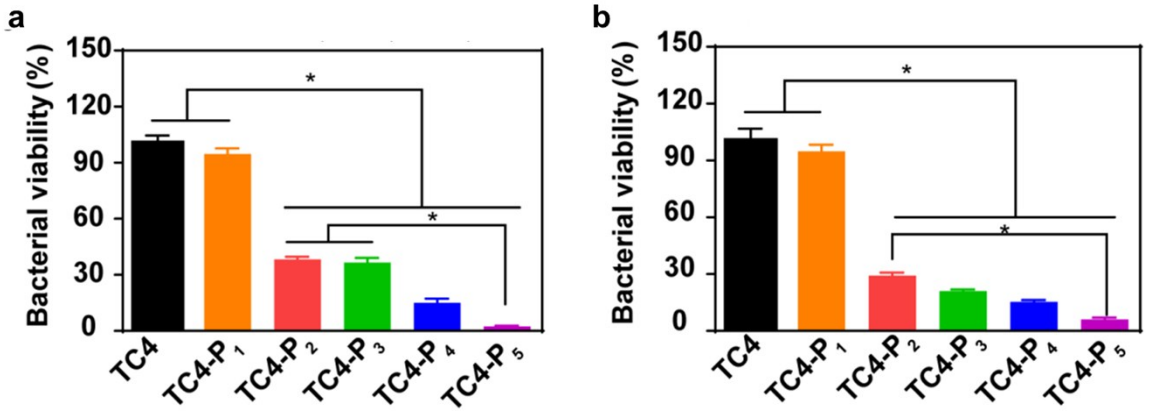

Fig. S3 Bactericidal properties of various block terpolymers coated surfaces. (a) Antibacterial efficiency of TC4 substrates against *S. aureus*. (b) Antibacterial efficiency of TC4 substrates against *E. coli*. Data are shown as mean ± SEM (n = 3). Statistical significance was determined by one-way ANOVA multiple comparison. Pairwise comparisons are statistically significant as denoted as *.

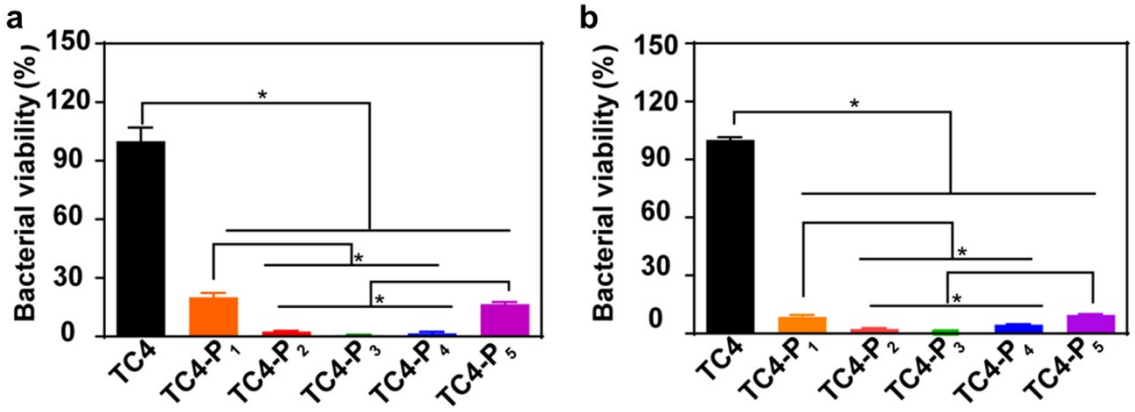

Fig. S4 Antifouling properties of various block terpolymers coated surfaces. (a) Antibacterial efficiency of TC4 substrates against *S. aureus* after washing with PBS. (b) Antibacterial efficiency of TC4 substrates against *E. coli* after washing with PBS. Data are shown as mean ± SEM (n = 3). Statistical significance was determined by one-way ANOVA multiple comparison.Pairwise comparisons are statistically significant as denoted as *.

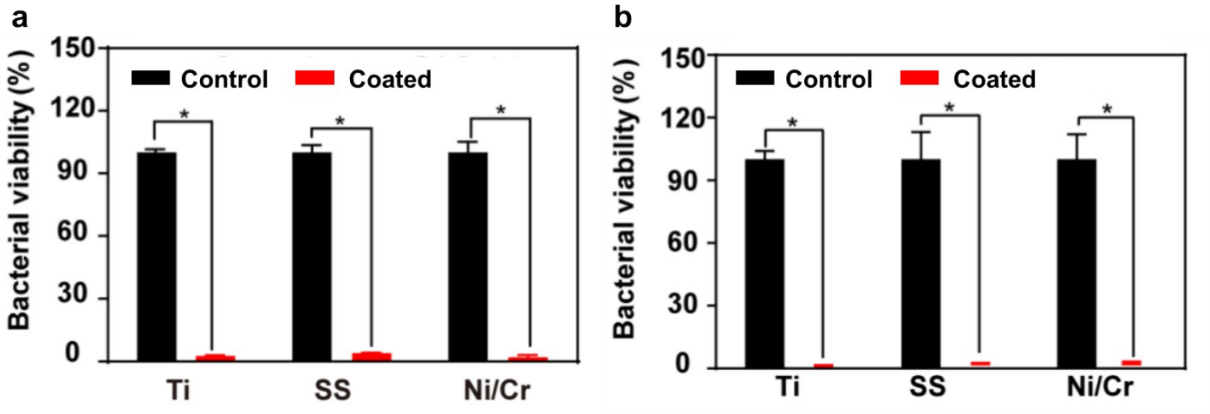

Fig. S5 Antibacterial and antifouling properties of pure titanium, stainless steel and Ni/Cr alloys coated with block terpolymers. (a) Antibacterial efficiency of titanium, stainless steel and Ni/Cr alloy substrates against *S. aureus*. (b) Antibacterial efficiency of titanium, stainless steel and Ni/Cr alloy substrates against *E. coli*. Data are shown as mean ± SEM (n = 3). Statistical significance was determined by two-way ANOVA multiple comparison tests. Pairwise comparisons are statistically significant as denoted as *.