

Electronic Supplementary Information for

Antibacterial performance of polymer quaternary ammonium salt - capped silver nanoparticles on *Bacillus subtilis* in water

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Supplementary information captions:

Fig. S1 The physicochemical properties of PVP-AgNPs. (a) UV–visible spectrum; (b) TEM image.

Fig. S2 Inactivation efficiency of *B. subtilis* with silver ions corresponding to different release from 1.0 mg/L of PQAS-AgNPs or PVP-AgNPs. Reaction conditions: reaction time = 60 min, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S3 Inactivation efficiency of *B. subtilis* with silver ions corresponding to different pH values (pH = 4.9, 7.1, 8.9). Reaction conditions: reaction time = 60 min, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S4 Effect of Cl⁻ on antibacterial efficacy to *B. subtilis* of PQAS. Reaction conditions: [PQAS] = 1.0 mg/L, contact time = 60 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S5 Effect of Cl⁻ on antibacterial efficacy to *B. subtilis* of PVP-AgNPs. Reaction conditions: [AgNPs] = 10.0 mg/L, contact time = 60 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S6 Effect of HA on antibacterial efficacy to *B. subtilis* of PVP-AgNPs. Reaction conditions: [AgNPs] = 10.0 mg/L, contact time = 60 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S7 FCM results of *B. subtilis* after treated by PVP-AgNPs. Among them, (a) to (d) represent the concentration of PVP-AgNPs is 1.0, 2.0, 5.0, 10.0 mg/L, respectively. Reaction conditions: reaction time = 15 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10⁶ CFU/mL.

Fig. S8 FCM results statistics of *B. subtilis* after treated by PQAS-AgNPs and PVP-AgNPs. Reaction conditions: reaction time = 15 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10^6 CFU/mL.

Fig. S9 Changes of ATP of *B. subtilis* after treated by PVP-AgNPs. Reaction conditions: reaction time = 15 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10^6 CFU/mL.

Fig. S10 ATP results statistics of *B. subtilis* after treated by PQAS-AgNPs and PVP-AgNPs. Reaction conditions: reaction time = 15 min, pH = 7.1, T = 25 °C, initial concentration of *B. subtilis*: 10^6 CFU/mL.

Fig. S1

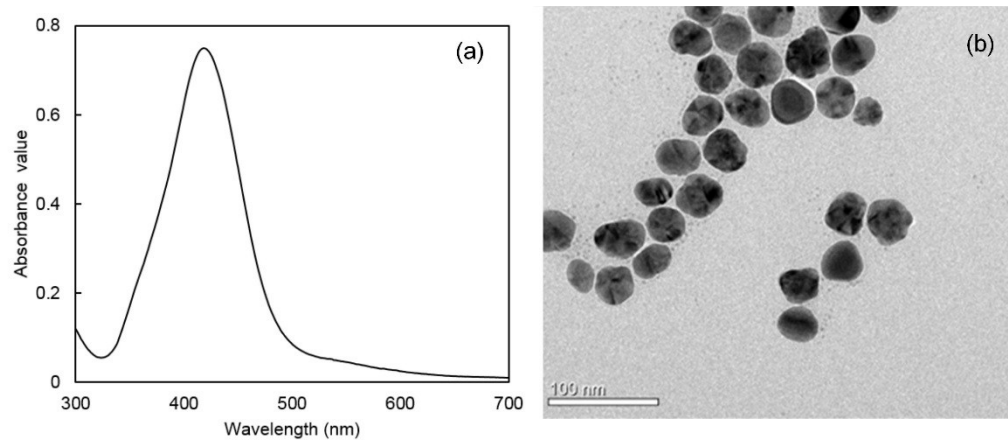


Fig. S2

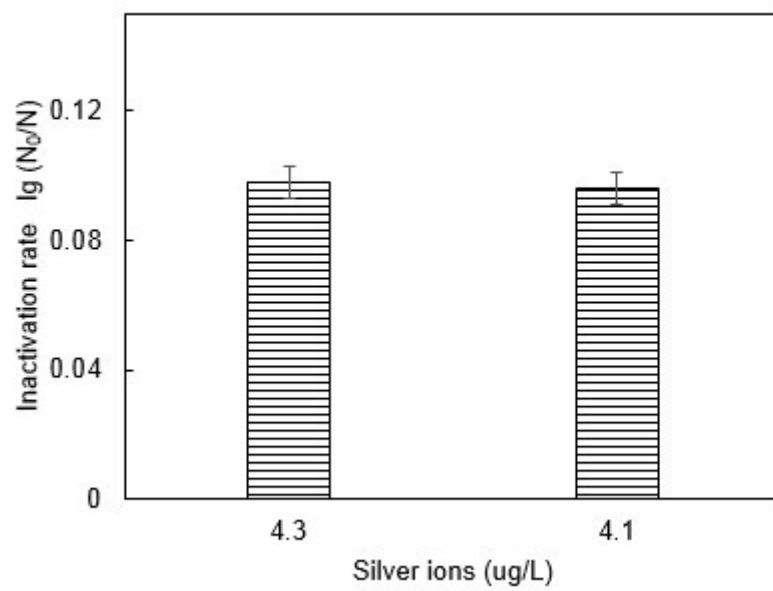


Fig. S3

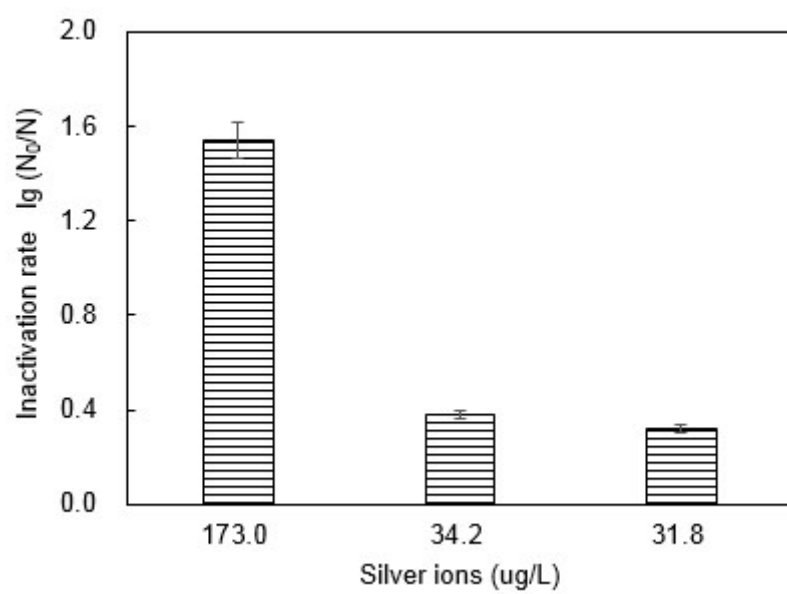


Fig. S4

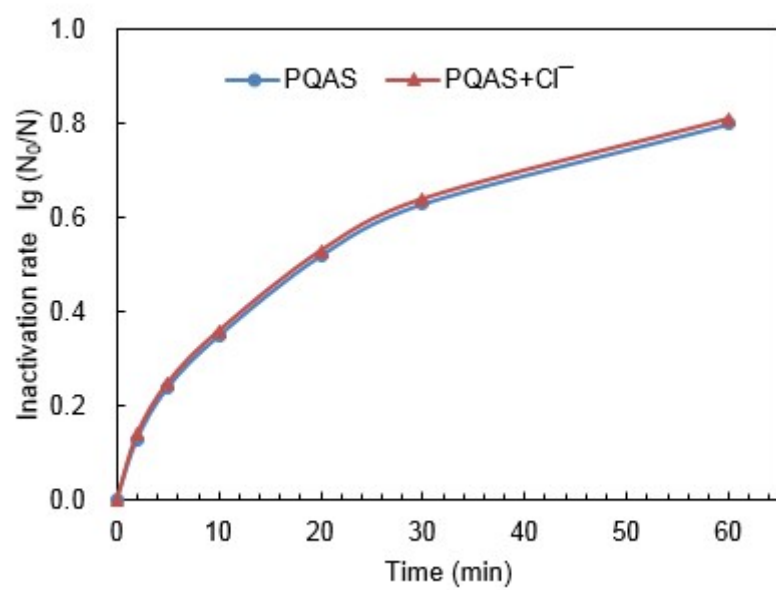


Fig. S5

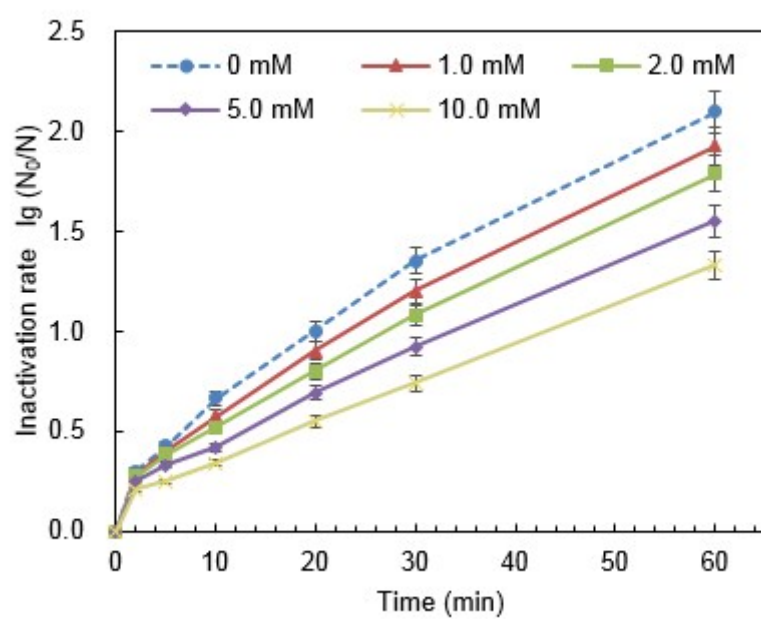


Fig. S6

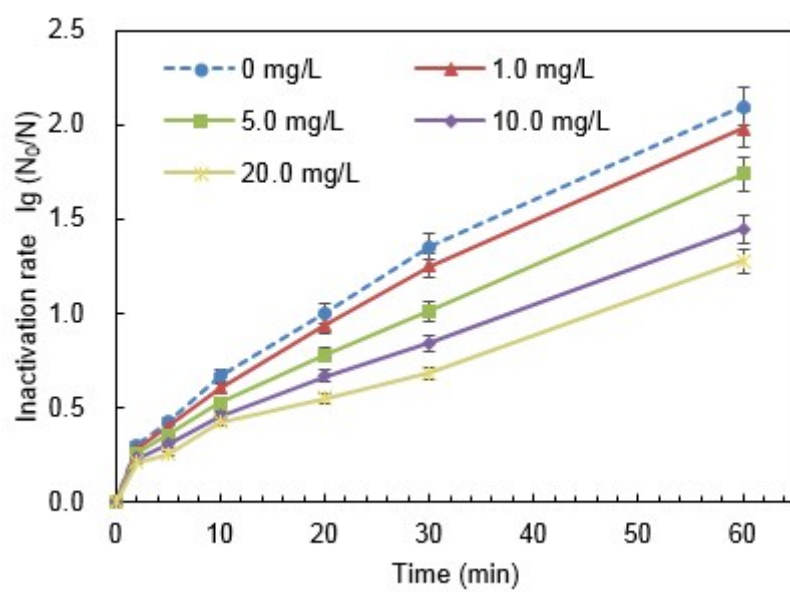


Fig. S7

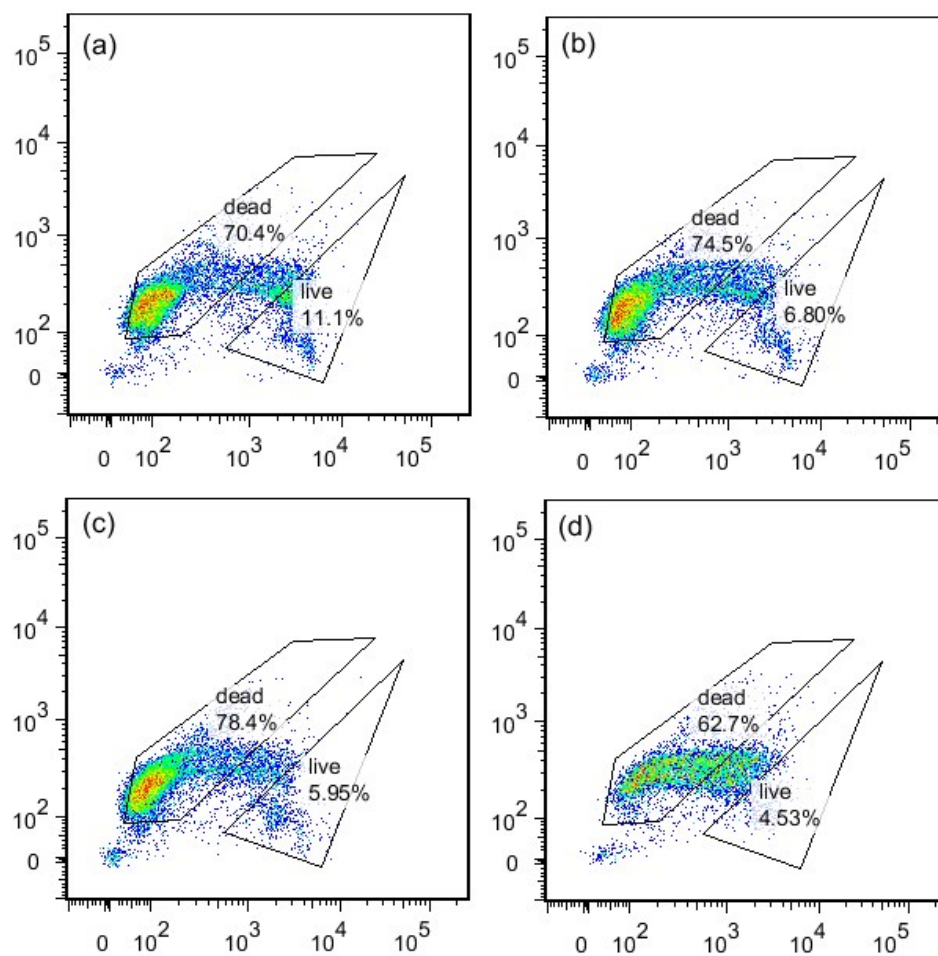


Fig. S8

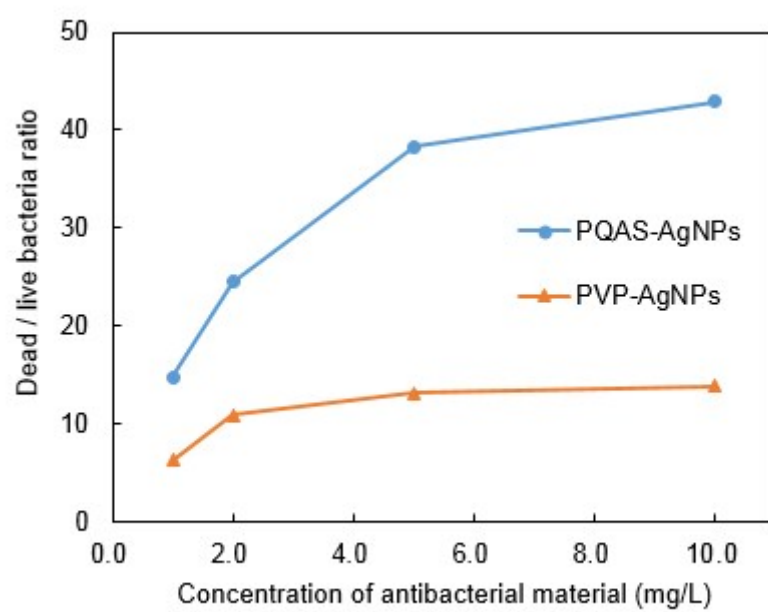


Fig. S9

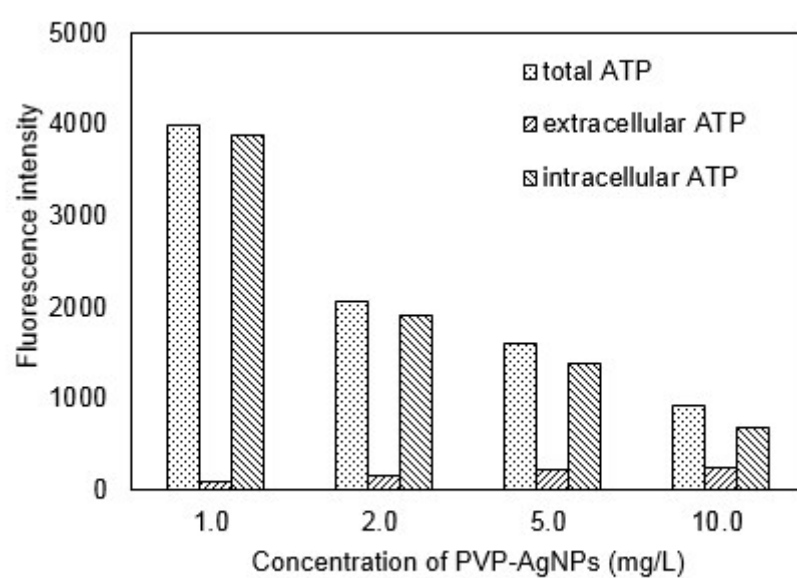


Fig. S10

