Supporting information for:

Comparative study of serum sample preparation methods for aggregation-based plasmonic sensing

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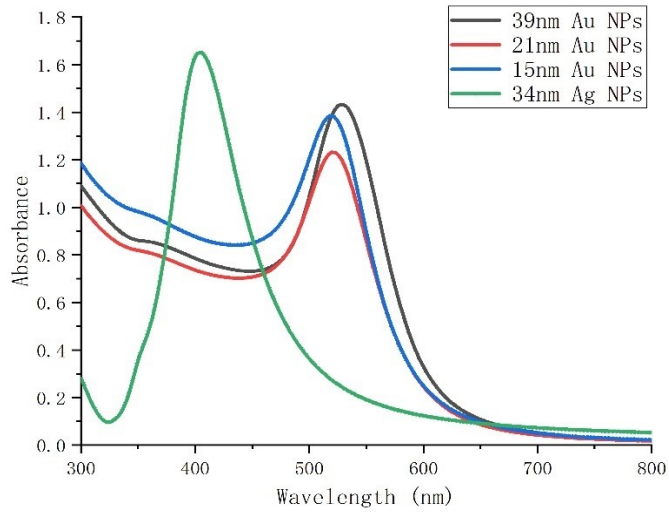


Fig. S1 UV-Vis spectra of Au NPs and Ag NPs in this study

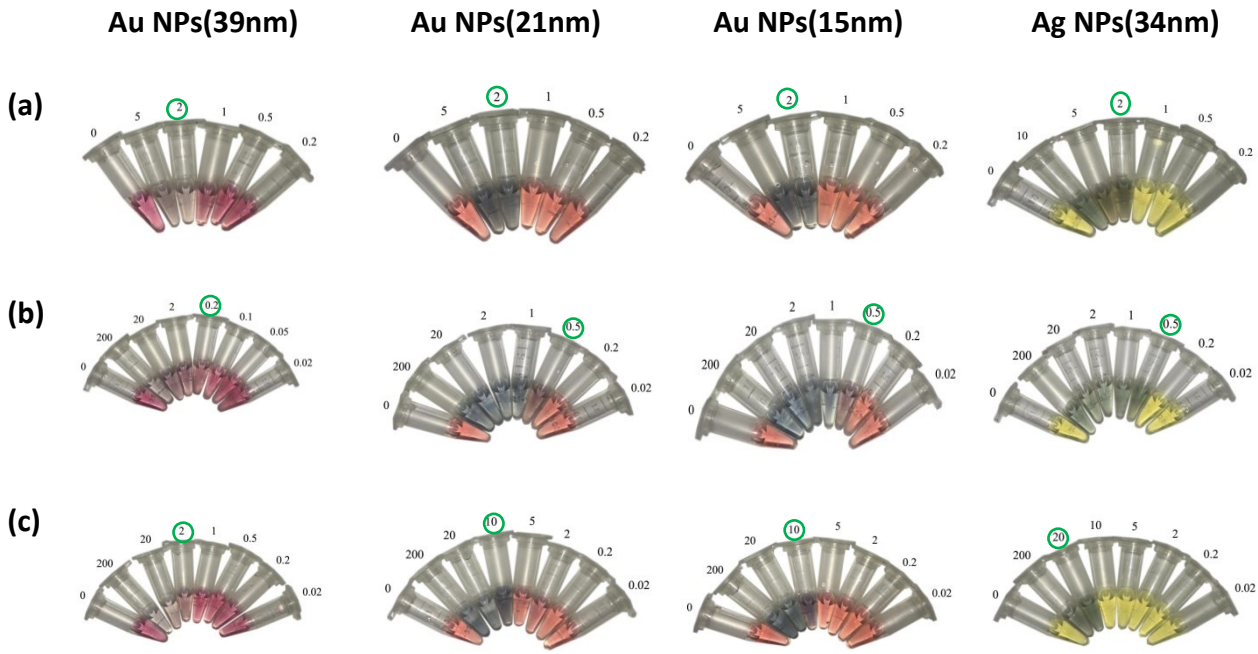


Fig. S2 Color changes of NPs induced by aminoglycosides antibiotics solutions in MilliQ water Detection of amikacin is shown in line (a), the results of tobramycin and streptomycin are shown in line (b) and line (c) respectively.

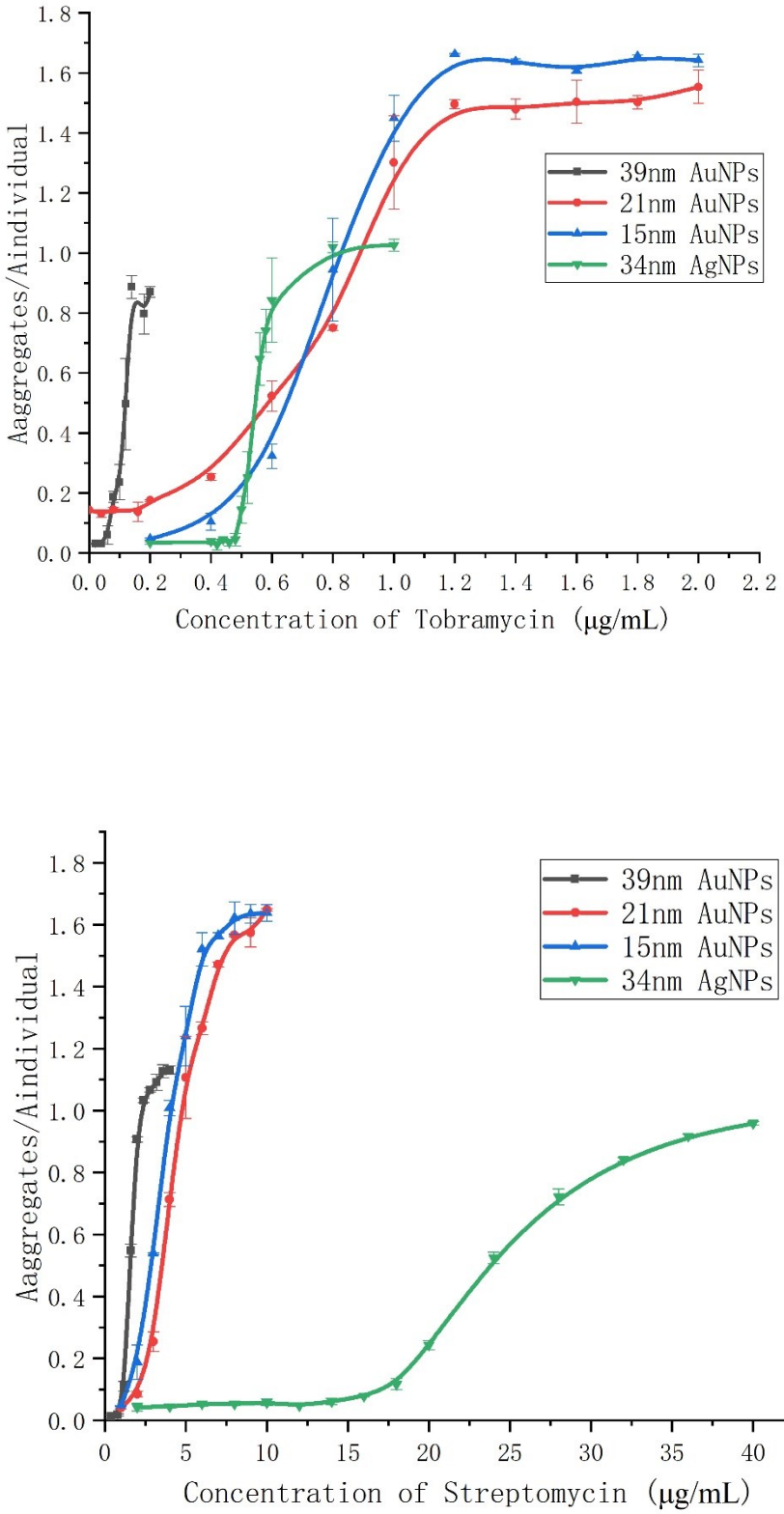


Fig.S3 Calibration curve of tobramycin (Top) and streptomycin (Bottom) in pure water.

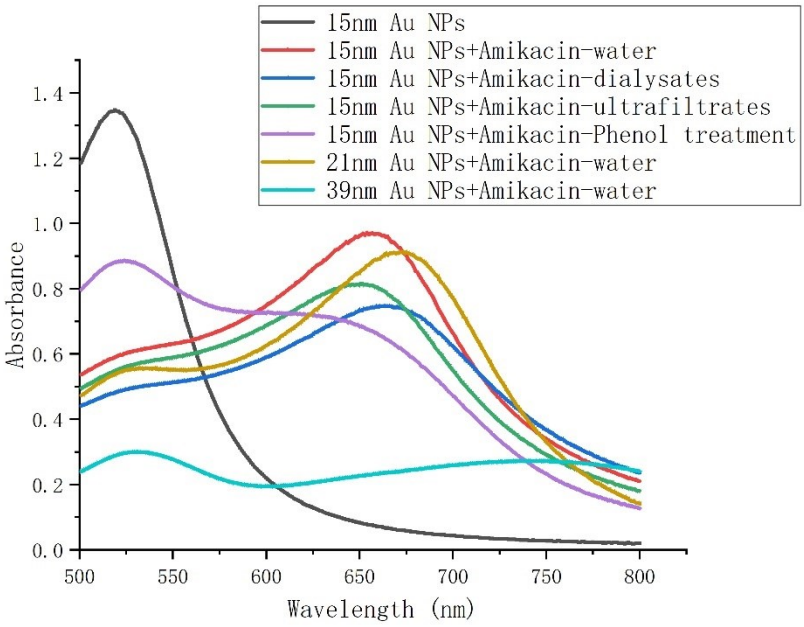
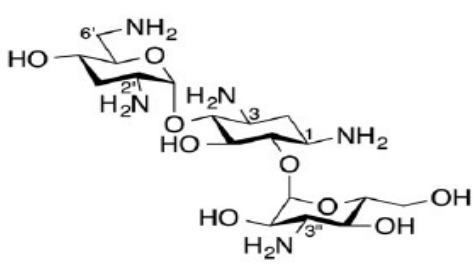
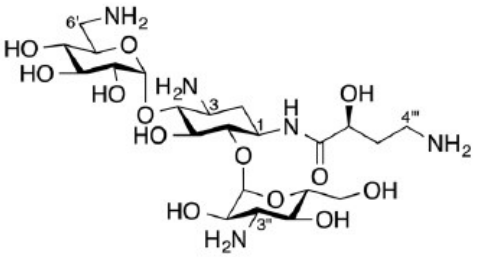


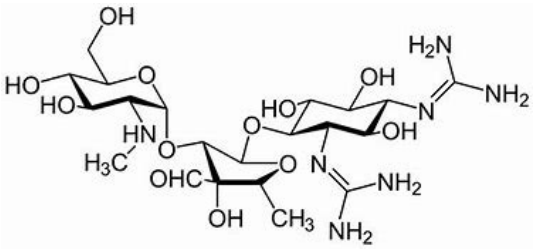
Fig. S4 SPR Wavelength shift of Au NPs induced by Amikacin in different solution



tobramycin



amikacin



streptomycin

Fig. S5 The structure of tobramycin, amikacin and streptomycin

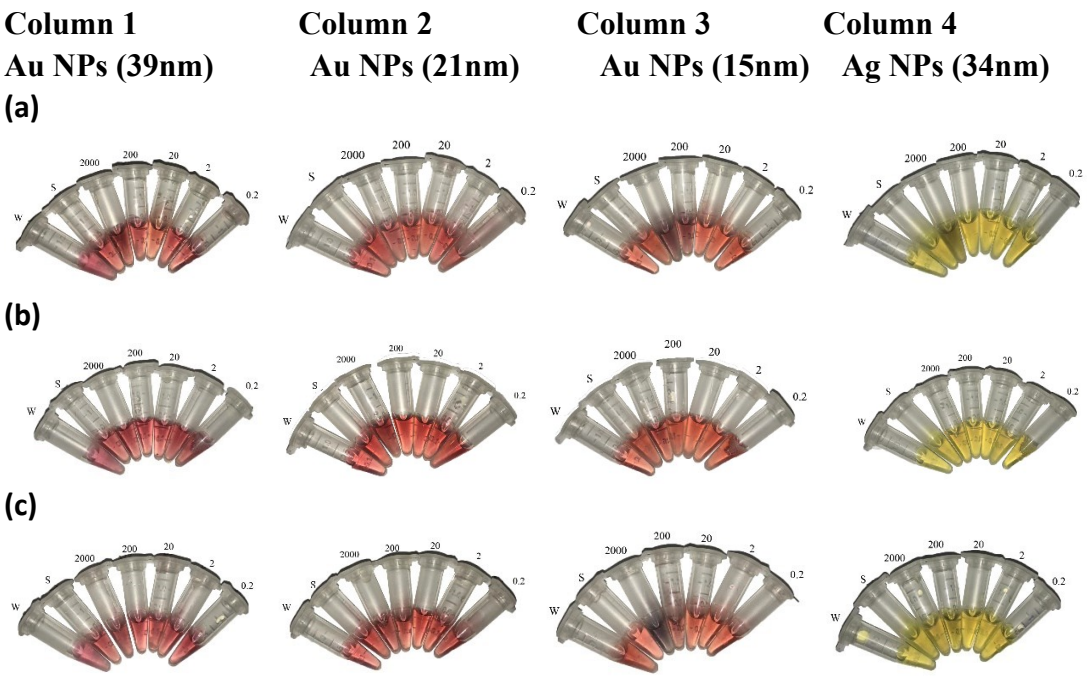


Fig. S6 Visualization of aggregation of Au NPs and Ag NPs caused by antibiotics in serum without any treatment. Detection of amikacin were shown in line (a), the results of tobramycin and streptomycin were shown in line (b) and line (c) respectively. The numbers indicated above the tubes refer to the concentration of aminoglycosides in μg/mL. W refers to water and S to serum.

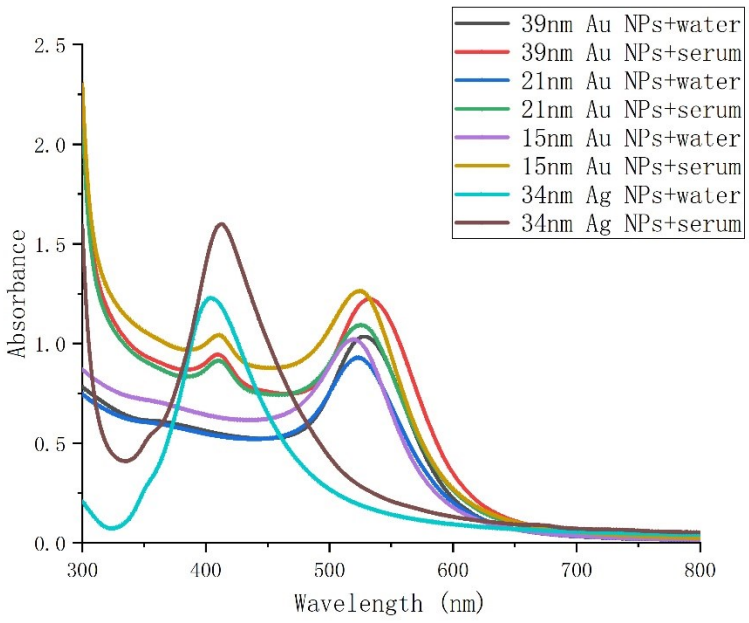


Fig. S7 SPR wavelength shift of NPs after NPs were mixed with serum

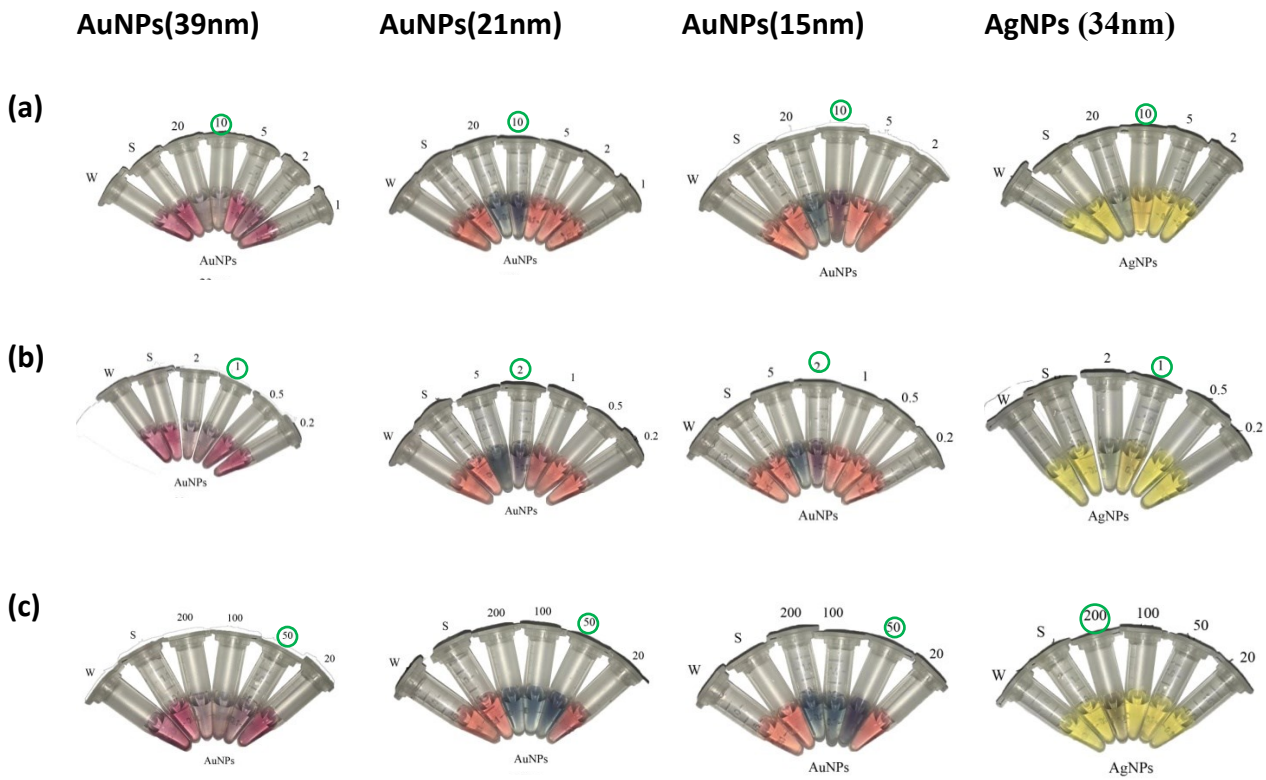
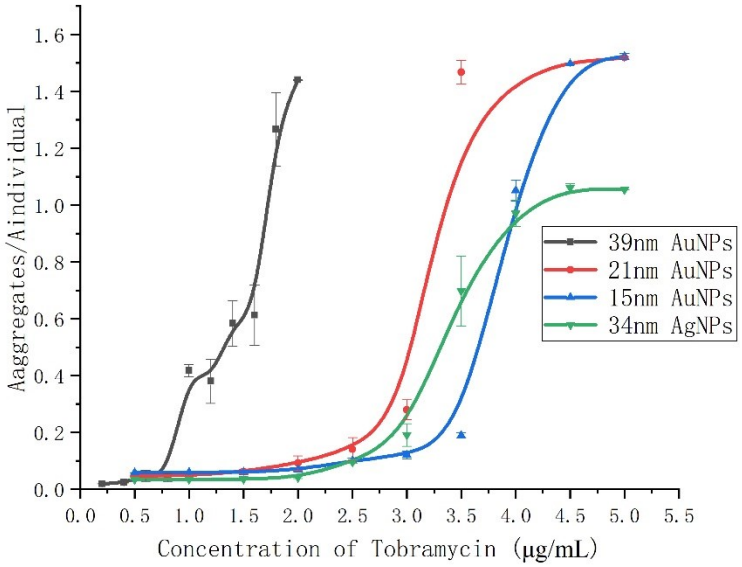


Fig. S8 Visual observation of aggregation of Au NPs and Ag NPs caused by antibiotics in dialysates. Measurement of amikacin were shown in line (a), detection of tobramycin and streptomycin were shown in line (b) and line (c) respectively.



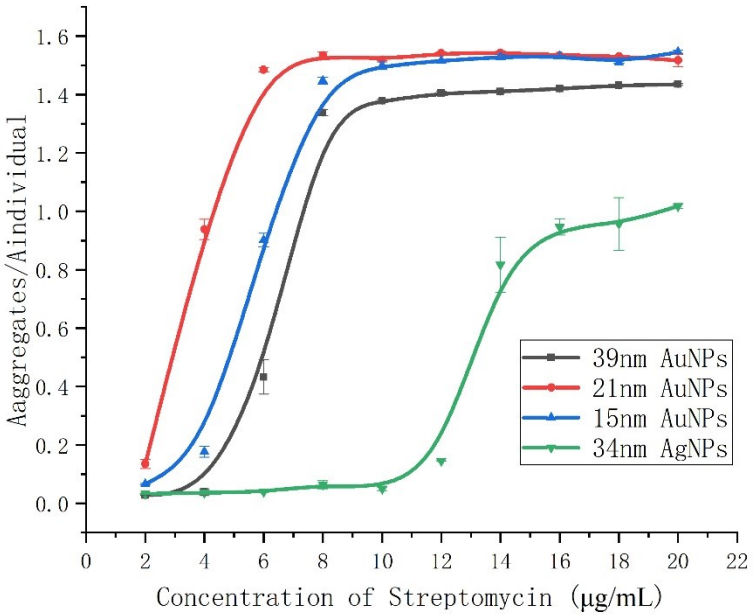


Fig. S9 Calibration curve of tobramycin (top) and streptomycin (bottom) in dialysates.

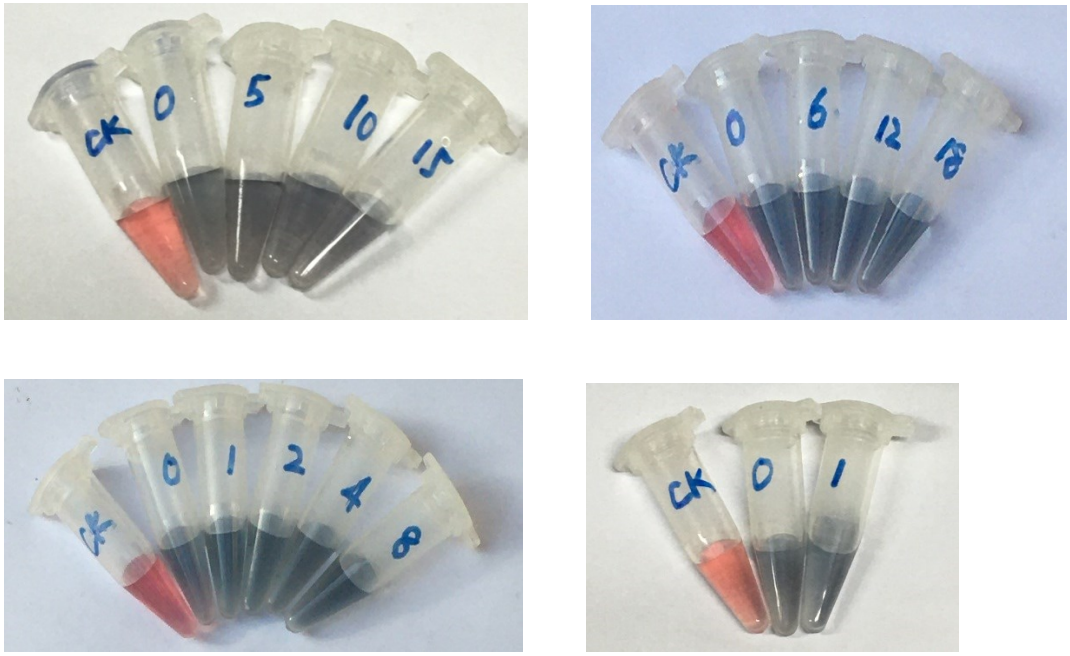


Fig. S10. Top left) Influence of NaCl on the antibiotic test . "CK" stands for the tube in which 300 µL of 21 nm Au NPs mixed with 100 µL MilliQ water, the number indicated on the other tubes refers to the concentration of NaCl in mM in the solution with 300 µL of 21 nm Au NPs mixed with 100 µL of 2 µg/mL amikacin solution. Top right) Glucose influence on the antibiotic test. Once again, "CK" stands for the tube in which 300 µL of 21 nm Au NPs mixed with 100 µL MilliQ water, while all the number on all other tubes refer to the concentration of glucose in mM with 2 µg/mL amikacin. Bottom left) Influence of the leucine concentration on the antibiotic test. As above, "CK" stands for the tube in which 300 µL of 21 nm Au NPs mixed with 100 µL MilliQ water, while the numbers on the other tubes refer to the concentration of the leucine in mM with 2 µg/mL amikacin. Bottom right) Triglyceride influence on the antibiotic test. "CK" stands for the tube in which 300 µL 21 nm Au NPs mixed with 100 µL MilliQ water, All other tube are numbered according to the triglyceride concentration in mM with 2 µg/mL amikacin.

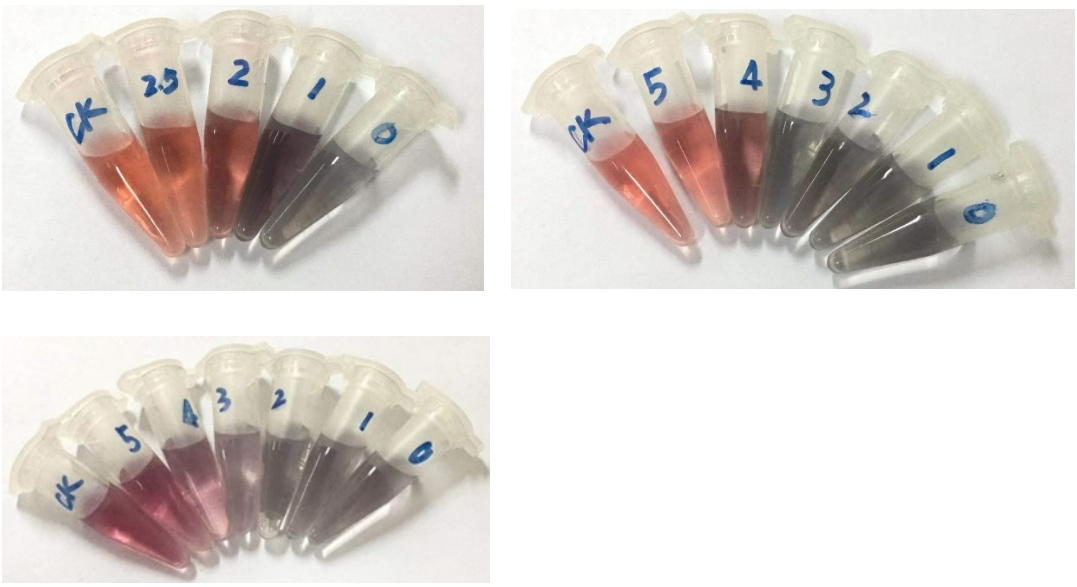


Fig. S11. Determination of appropriate dilution times for serum ultrafiltrates. Mixed 200 µL ultrafiltrate dilutions with 600 µL Au NPs. Top left) Dilution tests for 15 nm Au NPs, Top right) Dilution tests for 21 nm Au NPs, Bottom left) Dilution tests for 39 nm Au NPs, dilution times is indicated on tubes. "CK" stands for the tube in which 200 µL MilliQ water mixed with 600 µL Au NPs.

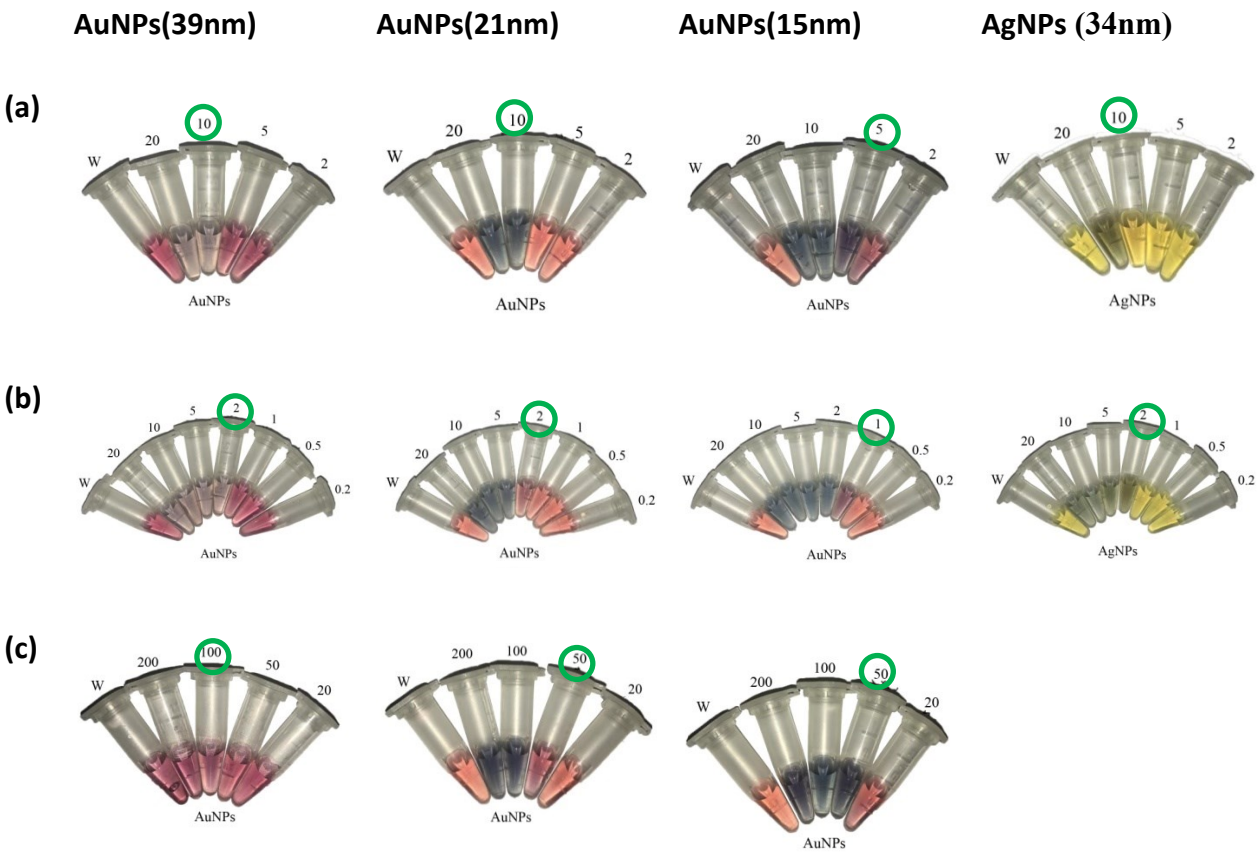
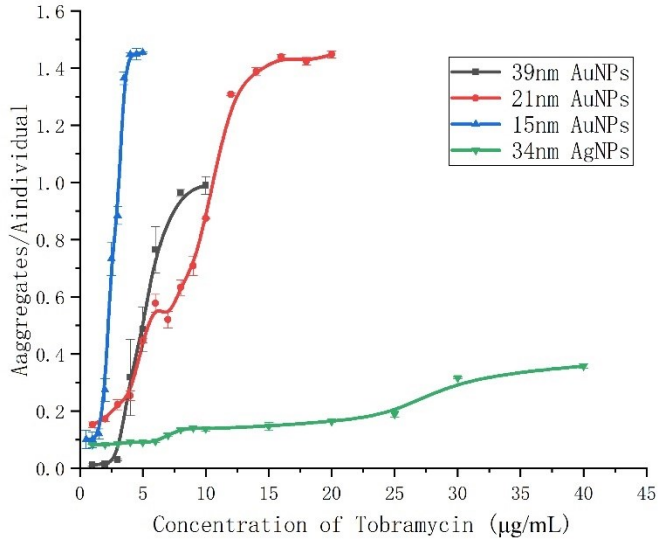


Fig. S12. Visual color change of different NPs induced by the presence of serum ultrafiltrates. (the figure of streptomycin detected by Ag NPs was not shown due to its low sensitivity). Monitoring of amikacin were shown in line (a), detections of tobramycin and streptomycin were shown in line (b) and line (c) respectively.



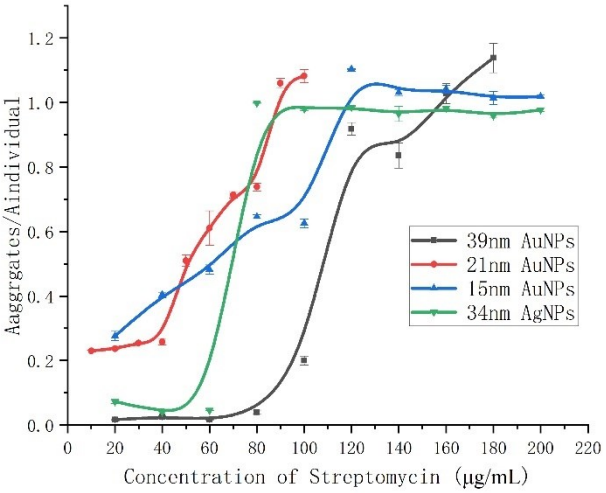


Fig. S13 Calibration curve of tobramycin (Top) and streptomycin (Bottom) in ultrafiltrates.

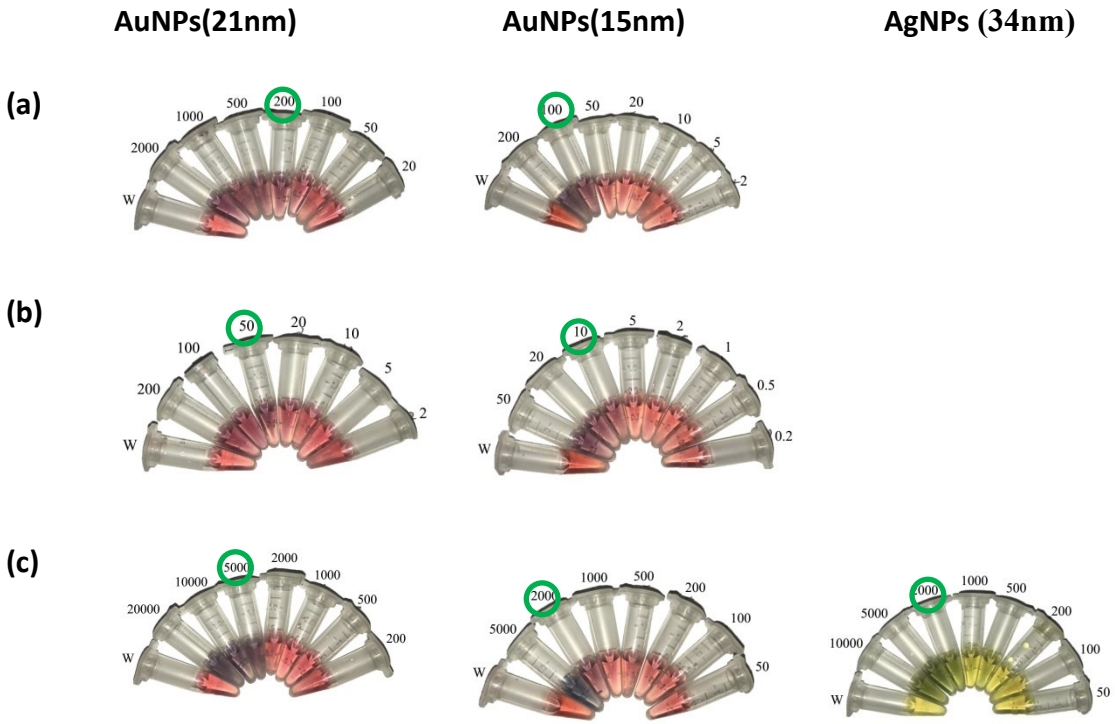


Fig. S14 Visual color change of different NPs induced by the presence of phenol treatment supernatant. Detection of amikacin were shown in line (a), the results of tobramycin and streptomycin were shown in line (b) and line (c) respectively. Some images are missing due to their low sensitivities.

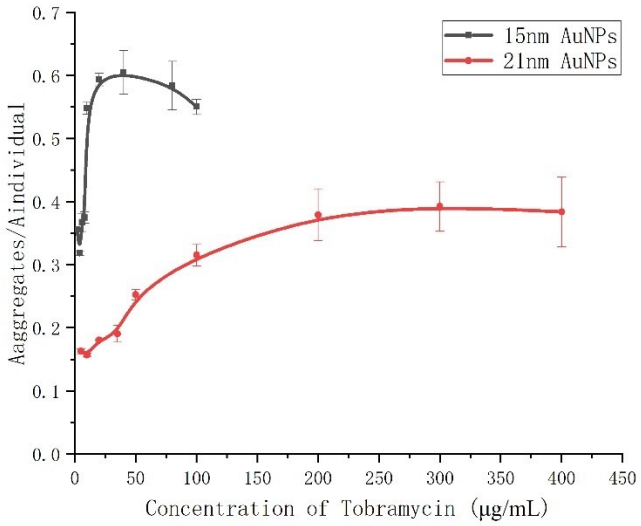


Fig. S15 Calibration curve of tobramycin after treatment with phenol:chloroform:isopentanol

Table S1: The relation between molar ratio of amikacin (2.67 μM) to 15nm Au NPs (3.8 nM) with SPR peak wavelength of aggregates and ratio of absorbance for aggregates and individual

Ratio of amikacin to 15nm Au NPs	$A_{aggregates}$ /$A_{individual}$	Wavelength of $A_{aggregates}$(nm)
No amikacin	-	519(individual)
2343:1(30% Au NPs solution)	1.36±0.01	619±2
1758:1(40% Au NPs solution)	1.36±0.05	619±3
1406:1(50% Au NPs solution)	1.47±0.03	627±1
1172:1(60% Au NPs solution)	1.34±0.06	621±7
1004:1(70% Au NPs solution)	1.08±0.02	614±1
879:1(80% Au NPs solution)	0.82±0.02	609±3
781:1(90% Au NPs solution)	-	-
703:1(100% Au NPs solution)	-	-*

Note:*No new peak is present although some aggregation occurs, the absorbance decrease much slower around 610nm.

Table S2: The relation between molar ratio of amikacin(2.13μM) to 15nm Au NPs with SPR peak wavelength of aggregates and ratio of absorbance for aggregates and individual

Ratio of amikacin to 15nm Au NPs	$A_{aggregates}$ /$A_{individual}$	Wavelength of $A_{aggregates}$(nm)
No amikacin	-	519(individual)
1870:1(30% Au NPs solution)	1.41±0.01	623±3
1402:1(40% Au NPs solution)	1.43±0.01	623±1
1122:1(50% Au NPs solution)	1.48±0.01	631±2
935:1(60% Au NPs solution)	0.95±0.01	606±2
801:1(70% Au NPs solution)	-	-
701:1(80% Au NPs solution)	-	-
623:1(90% Au NPs solution)	-	-
561:1(100% Au NPs solution)	-	-

Table S3 Relative Error of K_D in calibration curves for Au NPs

Relative Errors of K_D in calibration curves	Pure Water	Dialysates	Ultrafiltrates
15 nm Au NPs	1.8%	4.0%	3.3%
21 nm Au NPs	1.4%	3.9%	0.6%
39 nm Au NPs	6.4%	2.2%	16.3%