Support Information

Employing $CuInS_2$ quantum dots modified with vancomycin for detecting *Staphylococcus aureus* and iron(Ⅲ)

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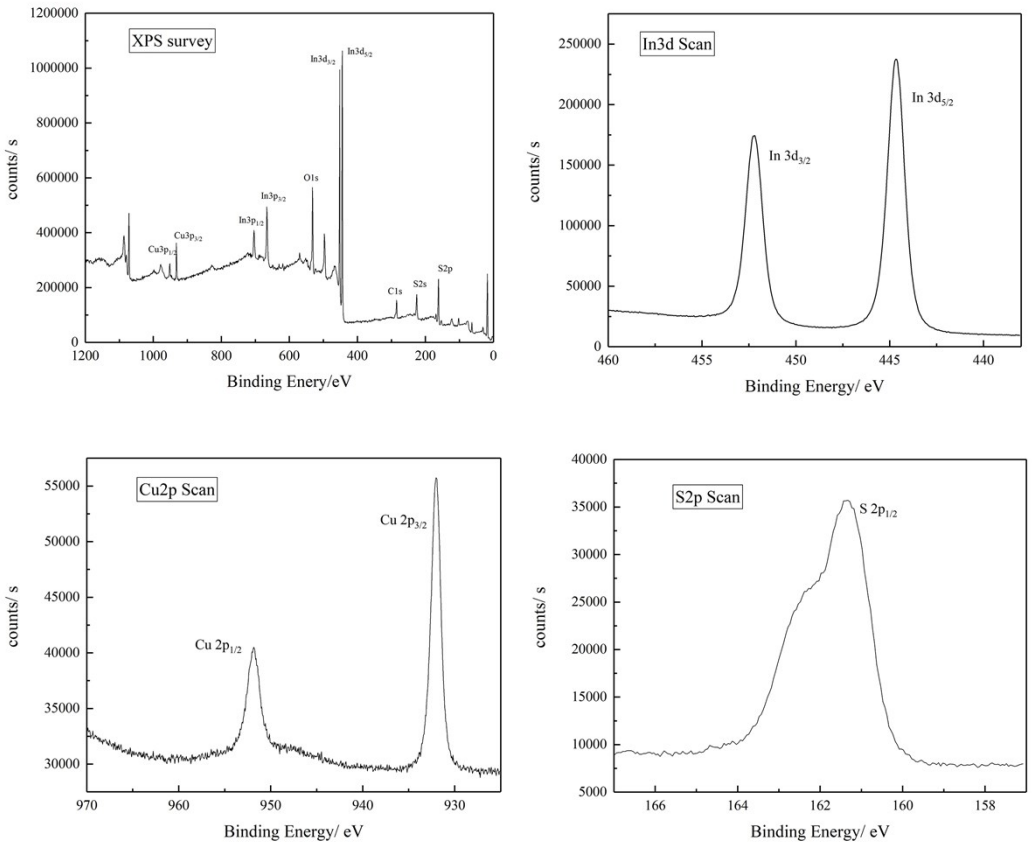
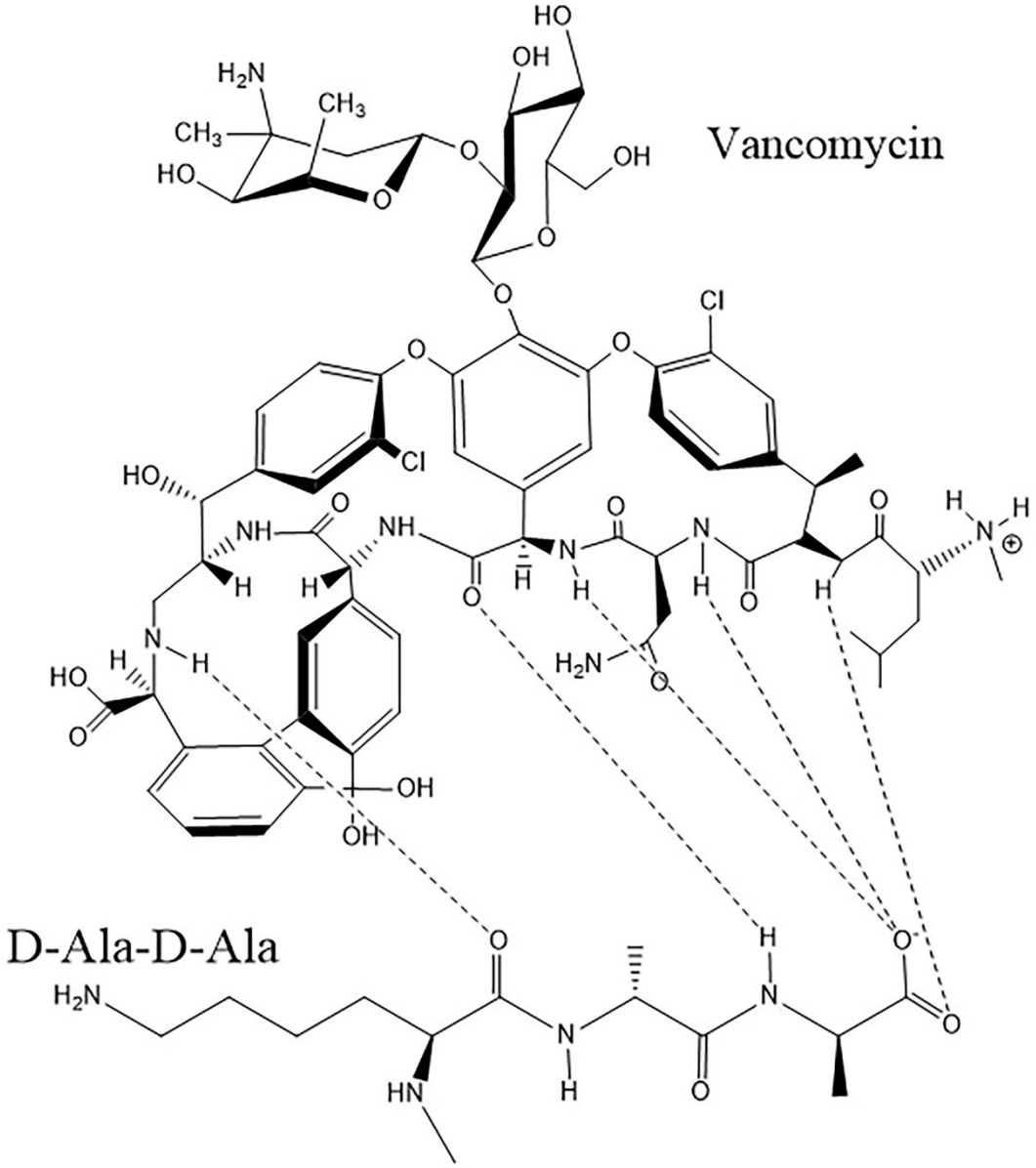
Fig S1



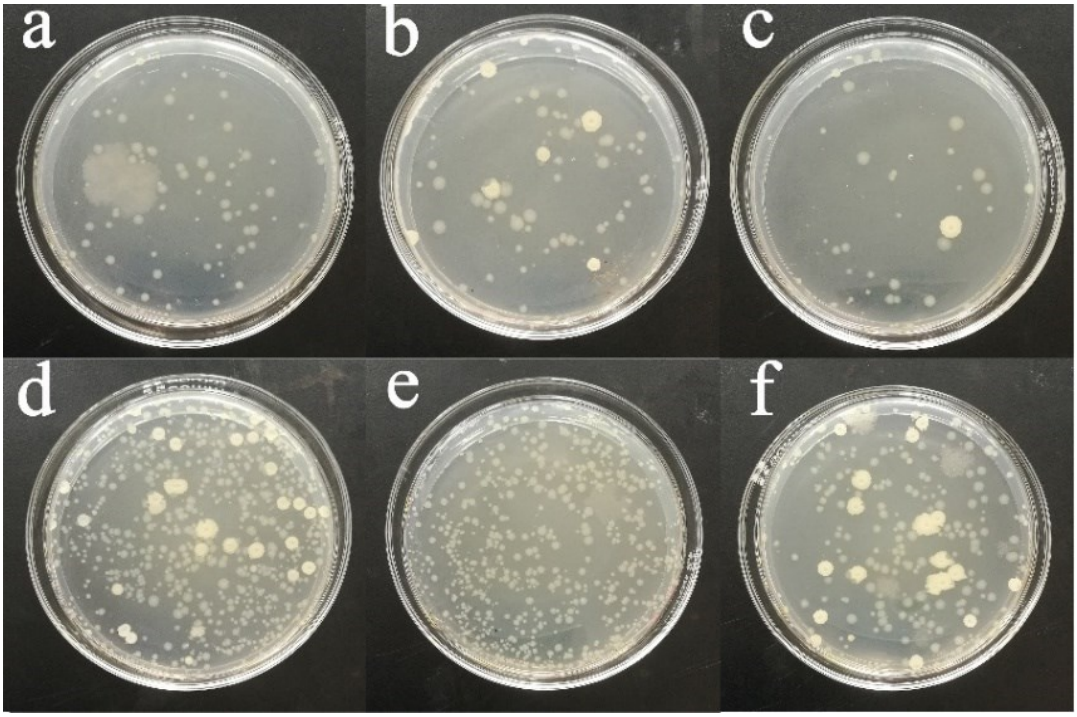
(A-D) XPS spectra of CuInS2 QDs.

Fig S2



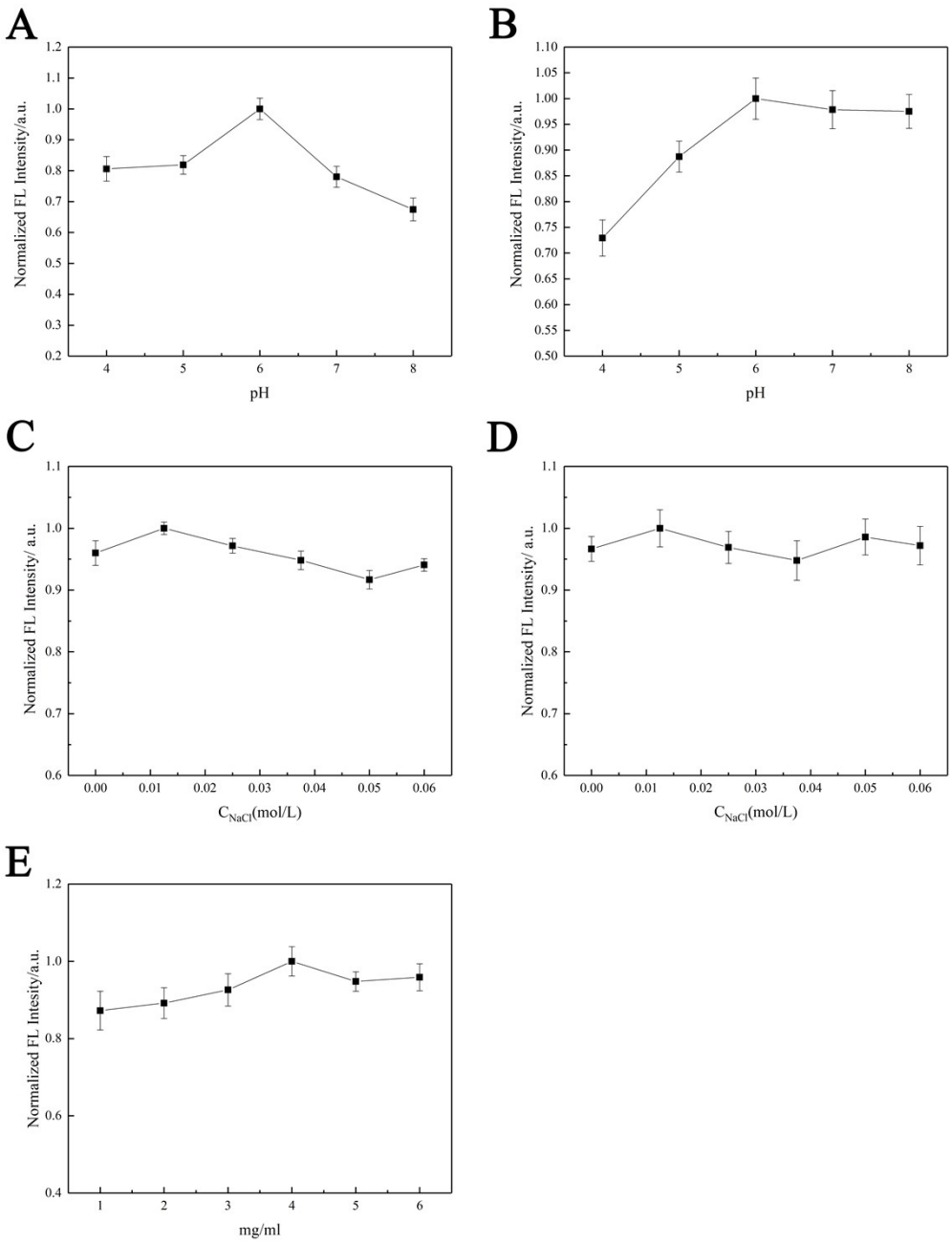
Hydrogen bond structure of vancomycin and D-Ala-D-Ala

Fig S3



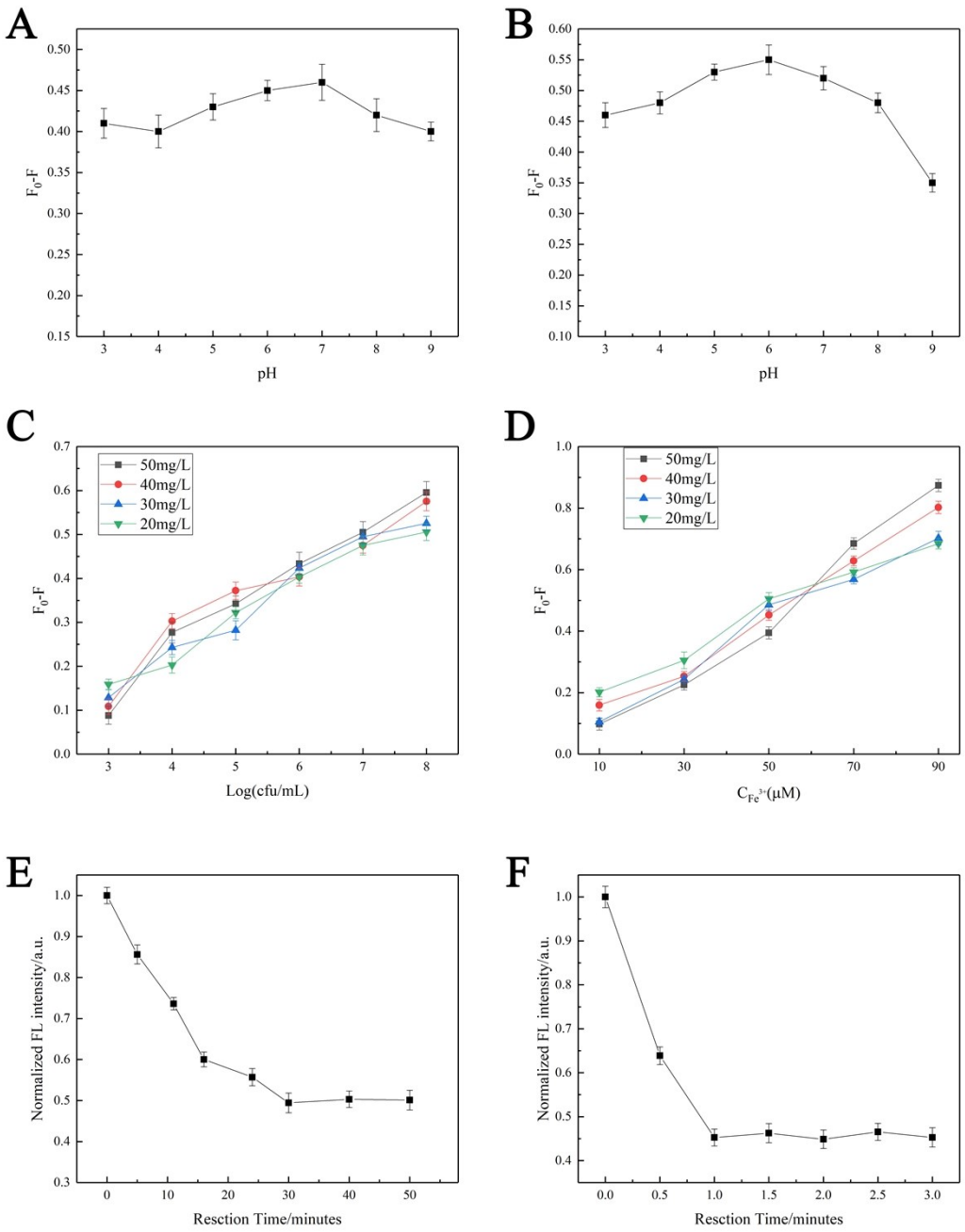
Single colony from *S. aureus* (9.18×107 cfu/mL) 100000 (a, b, c) and 10000 (d, e, f) folds diluted respectively for bacteria plate counting in the absence of $CuInS_2$ or $CuInS_2$@van (a, d) and in the presence of $CuInS_2$ (b, e) or $CuInS_2$@Van (c, f).

Fig S4



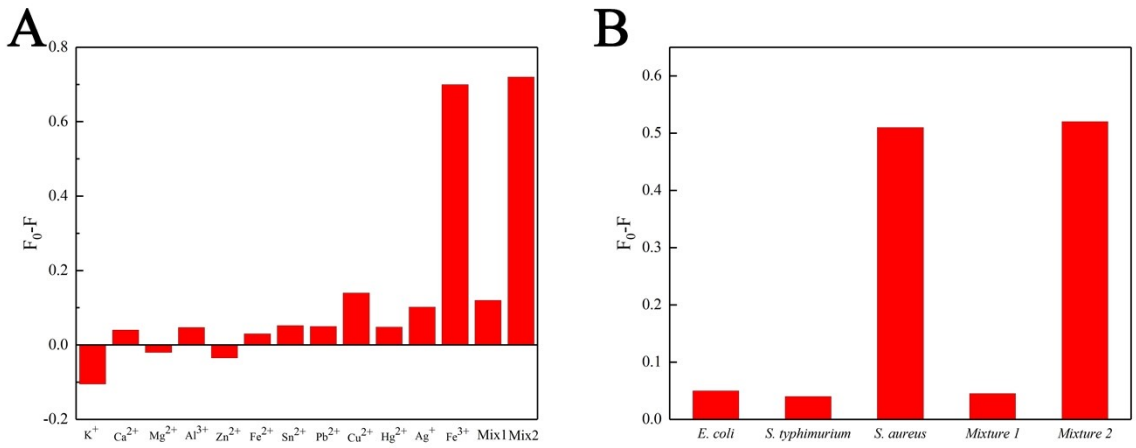
The fluorescence (FL) intensity of $CuInS_2$ QDs **(A)** and $CuInS_2$@Van QDs **(B)** at different pH values; The fluorescence (FL) intensity of $CuInS_2$ QDs **(C)** and $CuInS_2$@Van QDs **(D)** in the presence of NaCl in the concentration range from 0 to 0.06 mol/L; **(E)** The relationship between the fluorescence intensity of $CuInS_2$@Van QDs and dosage of Vancomycin.

Fig S5



Change of Fluorescence value of the *S. aureus* detecting system versus (A) pH, (C) concentration , (E) reaction time and Change of Fluorescence value of the iron(Ⅲ) detecting system versus (B) pH, (D) concentration , (F) reaction time under given conditions, respectively.

Fig S6



Selectivity of the $CuInS_2$@Van QDs toward Fe^{3+}(50 μM), the other metal ions(500 μM) and mixture of them; **(B)** Selectivity detection of the $CuInS_2$@Van QDs toward *Escherichia coli*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Bacillus subtilis* and mixture of them.

Table S1 Comparison between fluorescence sensors for the detection of Fe^{3+}

Material	Linear range (mM)	LOD (mM)	Reference
N-CDs	5-1280	4.67	[3]
GQDs	0-80	7.22	[4]
CH_3CN-H_2O(4:1,v/v)	50-400	8.43	[5]
triazole-based AIE materials	8-16	8	[6]
N-CDs	0-100	1.14	[7]
Ionic liquid functionalized carbon quantum dots	0-300	13.68	[8]
$Eu(tta)_3cptpy$-TiO_2	700-1000	23.71	[9]
pyrazole bearing imidazole frame	-	1.73	[10]
Terbium (III)-based MOF	0-1500	4	[11]
$CuInS_2$ QDs	10-90	3.5	Present work

*LOD = limit of detection

Table S2 A comparison of different Methods for the detection of *S. aureus* bacteria.

Method	Linear range (cfu/mL)	LOD* (cfu/mL)	Reference
Lateral flow assay (LFA)	1.0×10^3-1.0×10^8	1.0×10^3	[12]
Antibiotic-affinity chromatographic test strip	1.4×10^3-1.4×10^7	1.4×10^3	[13]
colorimetric sensors	5.0×10^2-5.0×10^4	1.1×10^2	[14]
Magnetic molecularly imprinted polymers	-	1.0×10^3	[15]
Enzyme-free hybridization chain reaction	0-1.0×10^4	4.0×10^2	[16]
Multiplex polymerase chain reaction	1.0×10^5-1.0×10^8	1.4×10^4	[17]
Selective fluorescence labeling and microchip electrophoresis	2.5×10^3-2.5×10^7	981	[18]
Fluorescence sensors	1.0×10^3-1.0×10^8	665	Present work

*LOD = limit of detection