Supplementary Information (SI) for Analyst.

Supporting information

Au-Ag@Au fiber surface plasmon resonance sensor for highly sensitive detection of fluoroquinolones residue

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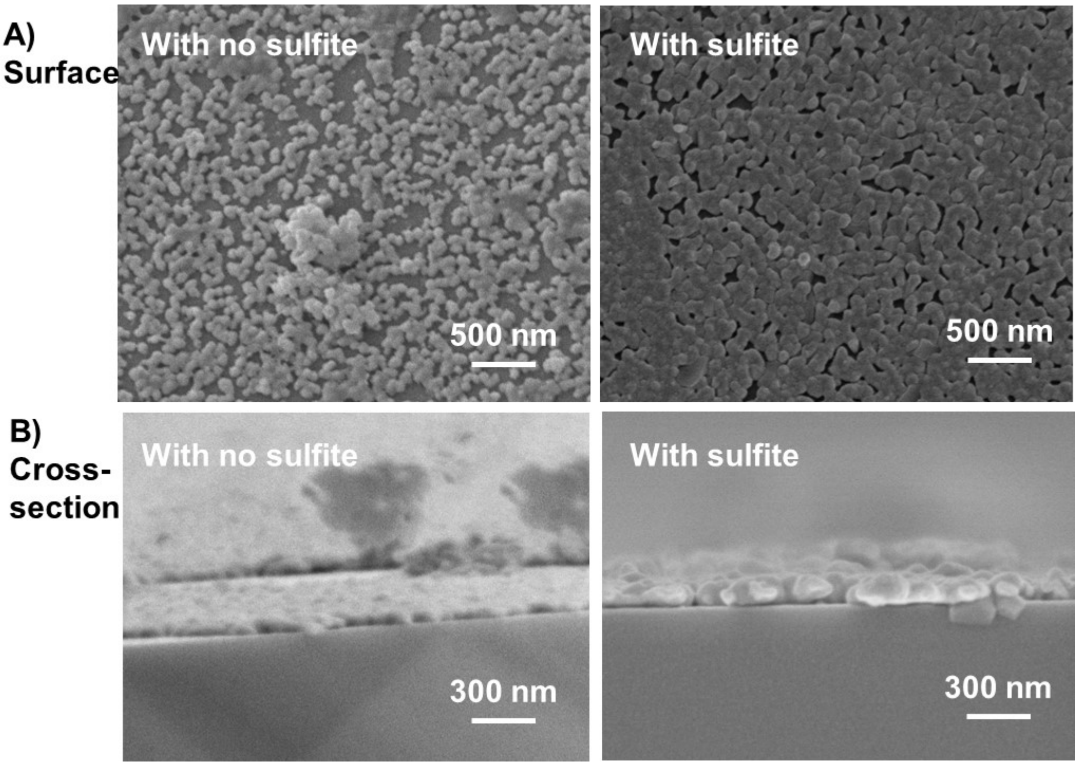

Fig.S1 SEM images of the surfaces A) and cross-sections B) of sensors prepared with or without sodium sulfite

As shown in Fig. S1, if sodium sulfite is not added, the surface distribution of the Au-Ag nanoparticle was uneven and the metal layer formation was not complete. Without the addition of sodium sulfite, the silver nanoparticles will be used as etching template to deposit Au film through the current galvanic replacement reactions. The SPR reflectance spectra (as shown in Fig. 4e-f) shows a small resonance wavelength shift, and even the reflection spectra of different solutions overlap. The resonance wavelength shift of the sensor is 0 under the change of refractive index, indicating that the SPR effect is very weak. What's more, it shows a nonlinear relationship in the relationship curve between the resonance wavelength and the refractive index of the solvent. When the sodium sulfite is added, it can be as a coordination aid to the epitaxial growth of Au for more complete gold film growth.

Table S1. Comparative results with other recoveries reported in the literature.

Target Analytes	Detection Methods	LOD	Recovery (%)	Refs.
Melamine	Label-free fluorescence	0.12 μM	82.6-97.2	1
Enro	Elisa	0.7 ng mL^{-1}	72.9–113.36	2
Enro	Fluorescent probe	8 ng mL^{-1}	83.7–87.7	3
Enro/Cip	Molecularly imprinted polymers	16 ng mL^{-1} (Enro) 19 ng mL^{-1} (Cip)	82.6–93.5 (Enro) 81.2–94.8 (Cip)	4
Quinolones antibiotics	SERS detection	0.37 pg mL^{-1}	86–121	5
Enro	Polymer-grafted nanographite	8.5 ngs mL^{-1}	68.5–81.2	6
Cip	Fluorescent probe	0.053 ng/mL	80.1–102.48	7

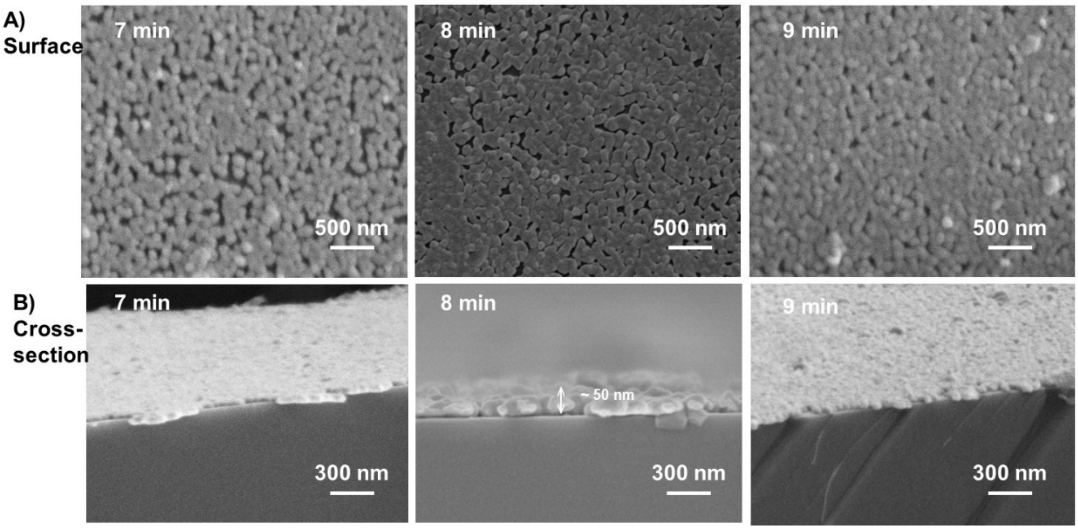

Fig.S2 SEM images of the surfaces A) and cross-sections B) of sensors prepared with different plating times.

The Au plating time of is an important factor affecting the sensitivity and spectral distribution of the sensor and it is related to the size of the nanoparticles and the thickness of the gold film. The size and growth of Au-Ag nanoparticles have a significant impact on wavelength shift. As shown in Fig. S2, the Au-Ag nanoparticles become larger with the longer time of gold plating. In addition, Au-Ag nanoparticles are considered to be a "quasi-silver" material with gold-like surface chemistry, and the ultra-thin gold shell helps to protect the internal silver core and avoid external influences on surface plasmon resonance, thereby improving the biocompatibility and signal stability of the particles. In addition, the surface plasmon resonance effect formed by the gap between the gold shell and the silver core can generate a powerful electromagnetic field.

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