

Supporting information

associated with the paper

Mechanical power driven SPME-SERS ultra-fast detection of illegal additives in aquaculture water

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In this work, we fixed the position of the substrate and used magnetic stirring to reduce the thickness of the boundary layer. It promotes the diffusion of the analyte and improves the extraction and enrichment efficiency. By stirring, we shortened the entire analysis and detection time.

We first investigated the effect of substrate position on the SERS signals. When the stirring rate was 1000 r/min, stirring time was 40 s, we examined the peak intensity of 10^{-5} M MG at 1174 cm^{-1} . As shown in Figure S1, when the substrate was away from the beaker wall 1.5 cm, the strongest signals were obtained. When the substrate is closer to the beaker wall, the liquid flow rate is lower, which reduces the extraction efficiency. When the substrate is far away from the beaker, that is, close to the center of the beaker, vortex will be generated due to magnetic stirring, and a hollow state will be generated on the surface of the stir bar, which will affect the contact between the analyte molecules and the substrate, thereby reducing the extraction efficiency. We finally chose to fix the substrate position at a distance from the beaker wall 1.5 cm.

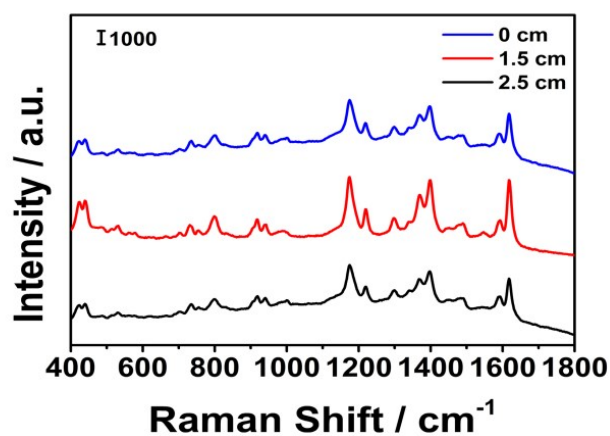


Figure S1 SERS signals collected at different locations

As Figure S2, we can see that the surface of the substrate we prepared only has Ag element. The Cl element you mentioned was not detected according to the EDS results. We think this may be due to the fact that most of the silver on the surface is not in the AgCl state, and the Cl element is too little to detect.

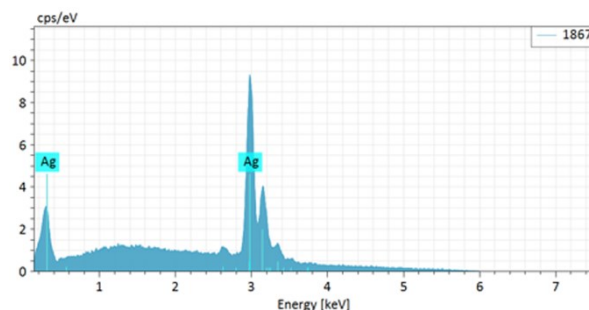


Figure S2 EDS result of Ag fiber

The long-term stability of the substrate is very important. As shown in Figure S3, the signal intensity of MG (concentration: 10^{-5} M) is almost unchanged after 5 days.

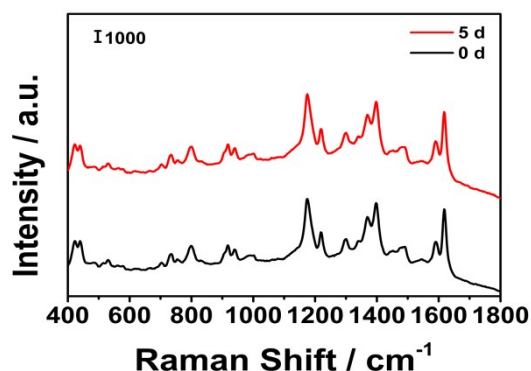


Figure S3 The long-term stability of Ag fiber

Table 1 Comparison of extraction time of different methods

Work	Material	Method	Analyte	Time
1 ¹	Ag@Au	Di-SPME-SERS	Nitrofurazone, semicarbazide	120 min
2 ²	Graphene-Ag	Di-SPME-SERS	BPA	30 min
3 ³	Au @ 4-ATP @ Ag - ZnO	Di-SPME-SERS	MG、CV	120 min
4 ⁴	Magnetic Silica-Ag	Di-MSPME-SERS	Sildenafil	10 min
5 ⁵	Au-ZnO	Di-SPME-SERS	MG、CV	120 min

This work	Ag	SME-SERS	MG、CV、thiram	< 1 min
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References

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