

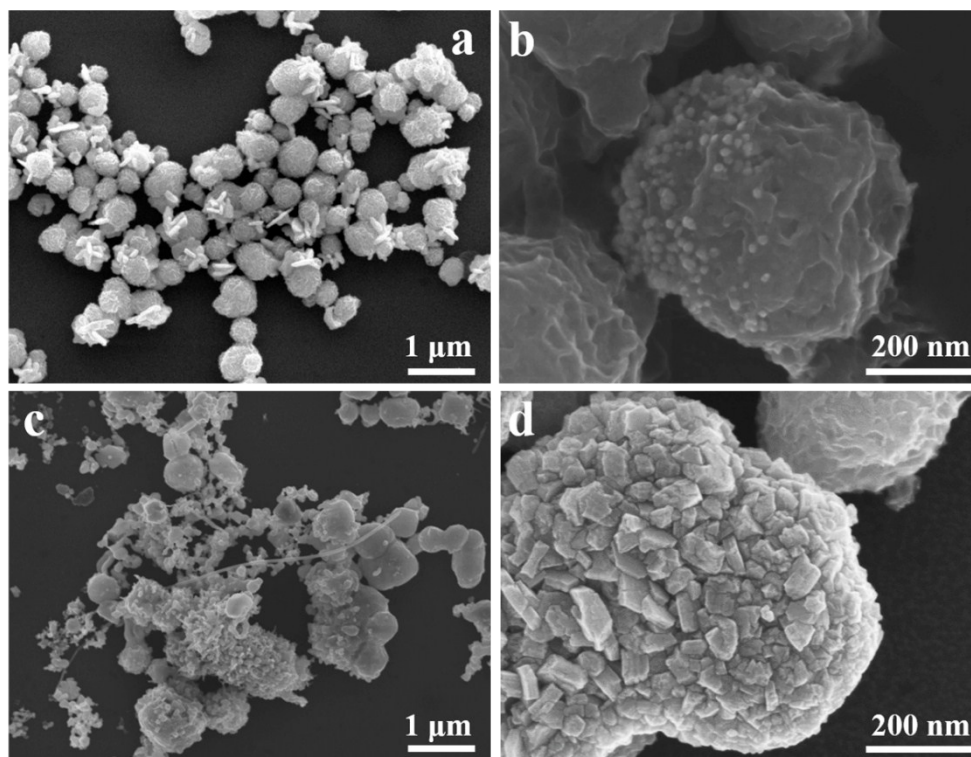
## Electronic Supplementary Material

### Interfacial synthesis of three-dimensional hierarchical MoS<sub>2</sub>-NS@Ag-NPs nanocomposites as SERS nanosensor for ultrasensitive thiram detection

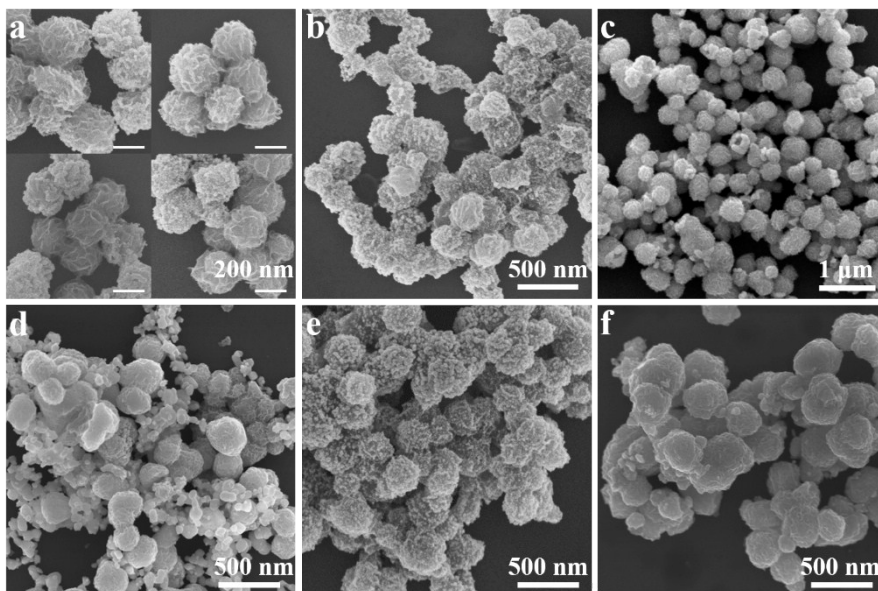
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**Fig. S1** SEM images of MoS<sub>2</sub>-NS@ Au-seeds (a)(b) and MoS<sub>2</sub>-NS@Ag-NPs(c)(d) in a low (a)(c) and high (b) (d) magnification prepared from homogeneous phase method.



**Fig S2.** (a-c) SEM images of MoS<sub>2</sub>-NS@ Au-seeds with different  $V_{oil}/V_{water}$  ratio of (a)100:1 (b) 33:1 and (c) 1:1; (d-f) SEM images of MoS<sub>2</sub>-NS@ Au-seeds with different MoS<sub>2</sub>-NSs concentration in water phase: (d) 3.3 mg/mL (e) 16.4 mg/mL and (f) 163.9 mg/mL.

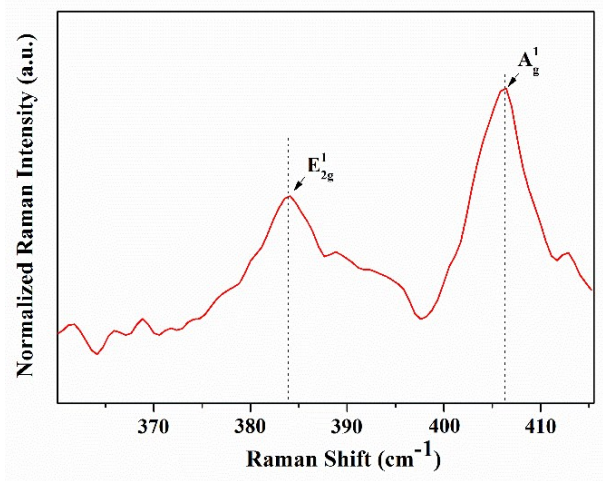


Fig S3. Raman spectrum of prepared 3D MoS<sub>2</sub>-NSs.

**Table S1.** Detailed experimental conditions in tuning the factors of  $V_{oil}:V_{water}$  and  $C_{MoS_2}$  (mg/mL) in the first synthesis of MoS<sub>2</sub>-NS @Au-seeds process.

Factors		$V_{oil}:V_{water}$			$C_{MoS_2}$ (mg/mL)				
		Ratio	100:1	33:1	1: 1	C	3.3	16.4	63.9
Experimental condition	Variables	$V_{oil}/mL$	61	20	20	$m_{MoS_2}/mg$	2.0	10.0	00.0
		$V_{water}/mL$	0.61	0.61	20	$V_{water}/mL$	0.61	0.61	0.61
	Constants	H <sub>2</sub> AuCl <sub>4</sub>	10 $\mu$ L, 0.25 M						
		NaBH <sub>4</sub>	0.6 mL, 0.1 M						

**Table S2.** The comparison of the previous thiram SERS sensors and our work.

<b>SERS substrate</b>	<b>EFs</b>	<b>Laser (nm)</b>	<b>Real sample (thiram)</b>	<b>linear range</b>	<b>LOD</b>	<b>ref</b>
AuNPs-based SERS tape	$1.3 \times 10^5$	633	spiked standard solution, no real sample	N/A	0.24 ng/cm <sup>2</sup>	[1]
Centimeter-scale Au nanoisland films (NIFs)	$10^7$ - $10^8$	785	thiram fungicide in apple peels	5-250 ppb	5 ng/cm <sup>2</sup>	[2]
Ag@MSiO <sub>2</sub> film	N/A	785	spiked standard solution, no real sample	$10^{-8}$ M- $10^{-2}$ M	$10^{-8}$ M	[3]
Au@Ag NPs	N/A	785	fruit peels	N/A	1.46 ng/cm <sup>2</sup>	[4]
3D Fe <sub>3</sub> O <sub>4</sub> @Ag-PEI-Au@Ag (CSSM)	$2.03 \times 10^8$	785	spiked standard solution, no real sample	N/A	$5 \times 10^{-12}$ M	[5]
3D MoS <sub>2</sub> -NS@Ag-NPs	$1.2 \times 10^8$	514	spiked standard solution, apple juice and lake water	10 ppb-1 ppm (42 nM-4.2 μM)	10 ppb (42 nM)	this work

N/A: Not Applicable.

## Reference

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