Supplementary Information

Quantitative and rapid lateral flow immunoassay for cardiac troponin I using dendritic mesoporous silica nanoparticles and gold nanoparticles

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1. Synthesis of colloidal gold nanoparticles (AuNPs)

The AuNPs was synthesized via the sodiumcitrate reduction method. Briefly, 100 mL of a 0.01%$HAuCl_4$ solution was heated to boiling. Upon reaching a boil, 1.6 mL of a 1% trisodium citrate solution was added while stirring continuously. Over time, the color of the solutionchanged to wine red, indicating the successful synthesis of colloidal gold. The finished product was then boiled for 5 min and cooled to room temperature. The diameter of the preparedcolloidal gold was approximately 25 nm (Figure S1).

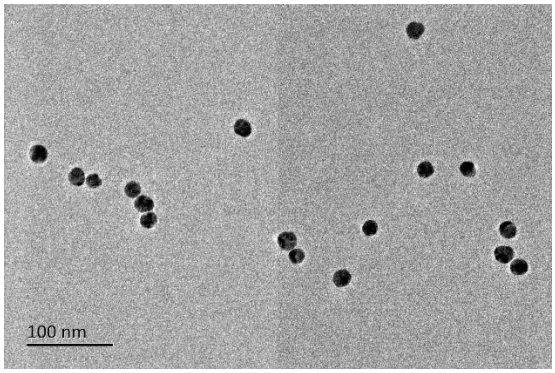

Figure S1. TEM images of AuNPs.

2. Synthesis of dendritic mesoporous silica nanoparticles（DMSNs）

The method of synthesizing DMSNs was referred to Gao et al. and Yang et al.[1,2] 408 mg of TEA was added to 150 ml of water and stirred at 80 ˚C for 30 min. 2.28 g of CTAB and 1.105 g of NaSal were then added to the mixture and stirred for 1 h. Then, 24 mL of TEOS and 1.58 mL of ethanol were added to the above solution, and stirring was continued for 2 h. High-speed centrifugation at 11,000 rpm for 15 min was performed to isolate the silica nano- particles were separated from the suspension and washed thoroughly with ethanol to remove the residual reactants. The synthesized dendritic mesoporous silica was finally dispersed in 200 mL of ethanol by extraction with acidic methanol (3 mL of 37 % HCl dissolved in 50 mL of anhydrous methanol) for three times (6 h each) at 60 °C.[3] The synthesis of other DMSNs of different sizes is shown in Table S1

For surface amination of DMSNs, 1 mL of 50 mg mL^{-1} DMSNs solution was taken and 62 μL APTES and 40 μL ammonia were added and stirred at room temperature for 12 h. The suspension was collected by high-speed centrifugation at 10,000 rpm for 20 min, washed twice with ethanol and twice with water. The resulting aminated DMSNs were dispersed in 50 mL of water.

Table S1. Specific reagent ratios for the synthesis of several different silica.

Size of DMSNs (nm)	TEA (mg)	CTAB (g)	NaSal (g)	TEOS (mL)	Ethanol (mL)
120	408	2.28	0.512	24	0.65
270	408	2.28	1.105	24	1.58
400	408	2.28	2.056	24	3.09

3. Evaluateion of the inter batch differences

In order to assess the differences between different DMSNs@Au batches, five different batches of DMSNs@Au were selected as LFIA markers for the detection of three different concentrations of cTnI The results showed that different batches of DMSNs@Au had almost no effect on the detection results, which proved the reliability and reproducibility of the experiment.

Table S2. Evaluateion of the inter batch differences

Concentration of cTnI (ng mL^{-1})	S_T/S_C detected by different batches of DMSNs@Au as markers					RSD (%)
	1	2	3	4	5	
0	0.112	0.110	0.110	0.109	0.110	0.110
10	0.330	0.331	0.331	0.330	0.332	0.084
50	0.998	0.996	0.997	0.996	0.996	0.089

REFERENCES

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