

Electronic Supporting Information for Analyst

A Single Light Spot GC Detector Employing Localized Surface Plasmon Resonance of Porous Au@SiO₂ Nanoparticle Multilayer

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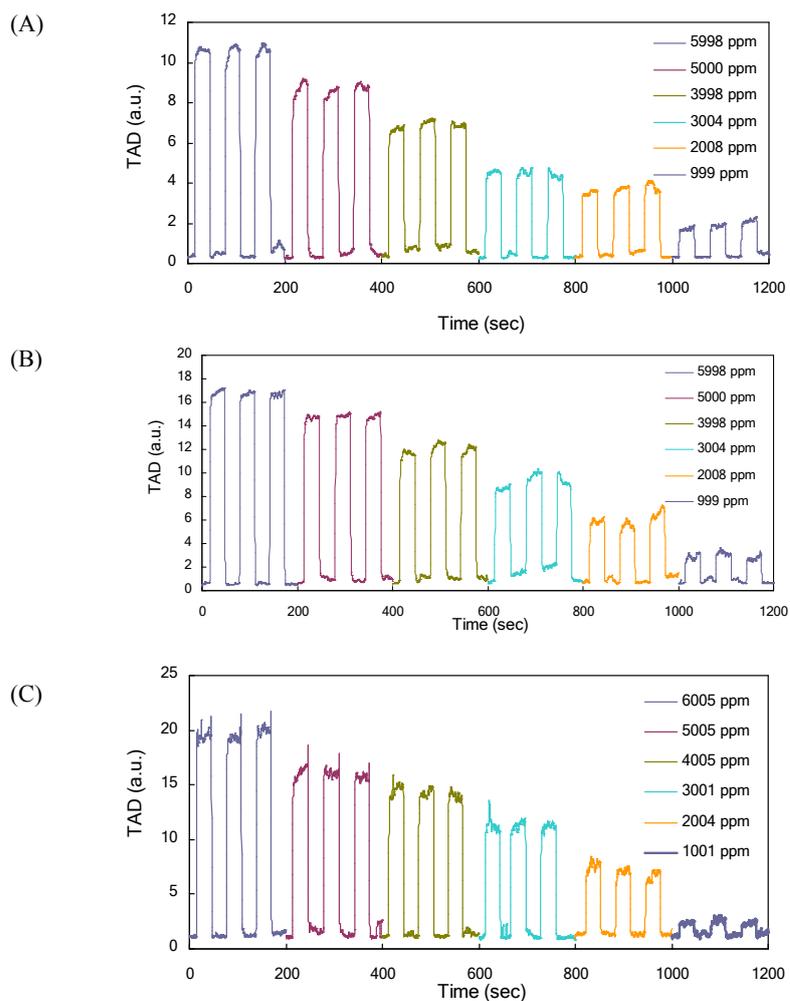


Fig. S1 *m*-Xylene response signals for LSPR sensors with different number of Au@SiO₂ multilayers. (A) two layers, (B) three layers, (C) four layers.

Table S1. Response times of Au@SiO₂ LSPR sensors with different number of layers

# of layers	1	2	3	4	5
T ₉₀	0.97	1.47	1.01	0.99	1.14
T ₂₀	1.46	1.7	1.52	1.42	1.22

* Response time unit in seconds

T₉₀: Time required from baseline to reaching 90% response equilibrium.

T₂₀: Time required from response equilibrium returning to 20% response above baseline.

Table S2. Comparison of signal and noise enhancement of multilayer and monolayer GC detector

	<u>monolayer</u>			<u>multilayer</u>			<u>improvement</u>		
	signal	noise	S/N	signal	noise	S/N	signal	noise	S/N
toluene	3946	251	15.7	50819	751	67.7	12.8	3.0	4.3
xylene	5554	251	22.1	66456	751	88.5	11.9	3.0	4.0

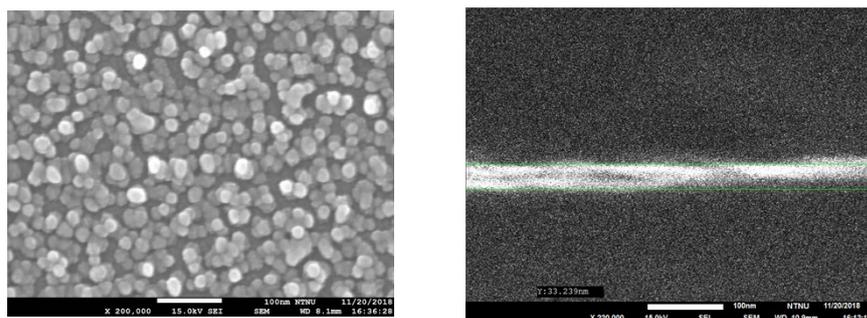


Fig. S2 Front image and side view SEM image of Au@SiO₂ multilayer. The effective thickness is approximately 40 nm.

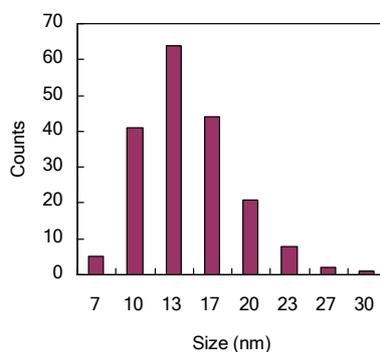


Fig. S3 Histogram for size analysis based on monolayer FESEM image. The sizes of Au nanoparticles are mainly distributed around 13±3 nm.

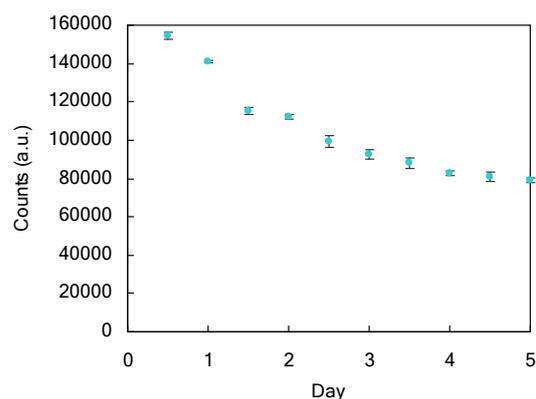


Fig. S4 Five-days continuous tracking of Au@SiO₂ multilayer responses to 4545 ppm m-xylene.

Note: Two sets of measurements are performed each day: one in the morning and one in the evening. There are 5 replicates in each set of measurement (n=5 for each point in above figure). As can be seen in this figure, the sensitivity of detector decays rapidly at first two days and gradually reaches stable responses at 4-5 days. This data suggest that the newly synthesized multilayer might need a few days to reach steady state.

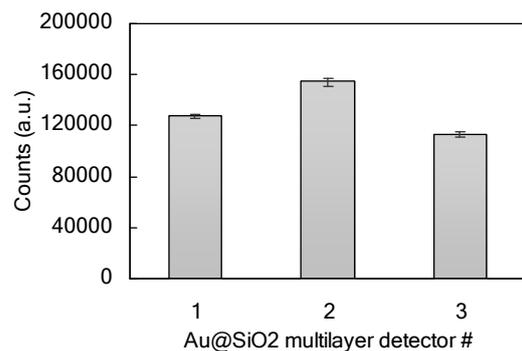


Fig. S5 Comparison among three different Au@SiO₂ multilayer detectors (4545 ppm *m*-xylene, n=5 for each detector).

Note: Three hand-made detectors were fabricated and run the side-by-side test with same *m*-xylene sample. Each detector was tested five times for its own stability measurements. Although there are some discrepancies among these three detectors, all three of them can provide significant responses to *m*-xylene.