Supplementary data

Highly Sensitive Electrochemical Detection of Methyl Salicylate Using

Electroactive Gold Nanoparticles

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Figure S1. SEM images of (a) SPCE and (b) AuNP-SPCE. These images are measured at 10 kV with 5000x magnification for SPCE and 10000x for AuNP-SPCE.



Figure S2. CVs of planar gold in the potential range of -0.1 to 0.7 V (wide range) and 0.3 to 0.7 (narrow range) in the presence of 1.7×10^{-3} M methyl salicylate.



Figure S3. CVs of (a) AuNP-SPCE, (b) planar gold and (c) SPCE in the linear range of current density response for various methyl salicylate concentrations (Table 1), where it shows that the AuNP-SPCE exhibits higher current density than the other two electrodes at 0.5 V.



Figure S4. CVs of AuNP-SPCE in the absence and presence of 3.6×10^{-5} M methyl salicylate, where the concentration of methyl salicylate is nearer to the LOD.



Figure S5. CVs of SPCE contains (a) 20 nm AuNP, (b) 40 nm AuNP, (c) 60 nm AuNP and (d) 80 nm AuNP in the presence of $1.7x10^{-3}$ M methyl salicylate. (a'), (b'), (c') and (d') are the same electrodes in the absence of methyl salicylate. The inset shows the methyl salicylate concentration (x-axis) vs. linear increase in current density (y-axis) ($6.2x10^{-5}$ to $1.7x10^{-3}$ M) for the above mentioned electrodes. For the inset plot the current density was measured at 0.5 V.



Figure S6. DPVs of (a) AuNP-SPCE, (b) planar gold and (c) SPCE in the linear range of current density response for methyl salicylate concentrations (Table 1), where it shows that the AuNP-SPCE exhibits higher current density than the other two electrodes at 0.45 V.



Figure S7. DPVs of SPCE contains (a) 20 nm AuNP, (b) 40 nm AuNP, (c) 60 nm AuNP and (d) 80 nm AuNP in the presence of 1.6×10^{-3} M methyl salicylate. (a'), (b'), (c') and (d') are the same electrodes in the absence of methyl salicylate. The inset shows the methyl salicylate concentration (x-axis) vs. linear increase in current density (y-axis). The methyl salicylate concentration was from 6.1×10^{-5} to 1.6×10^{-3} M for 20, 40 and 60 nm AuNP. For 80 nm AuNP it was from 6.1×10^{-5} to 9×10^{-4} M. For the inset plot the current density was measured at 0.45 V.



Figure S8. DPVs of methyl salicylate response measured ($7x10^{-4}$ M at 0.45 V) repeatedly at different AuNP-SPCE, where it has the variation coefficient of 5% (n = 6). This result shows that the response of methyl salicylate at AuNP-SPCE is highly repeatable.

Day	Methyl	Current change	SD (µA)	Variation
	salicylate (mM)	(μΑ)		coefficient (%)
1	0.7	2.68	0.99	7.1
1 - 2	0.7	3.15	1.10	8.0
2 - 6	0.7	1.13	0.57	4.8
6 - 8	0.7	4.43	2.22	24.8
1 - 8	0.7	8.37	2.47	19.5

Table S1. Stability and reusability of the AuNP-SPCE for methyl salicylate determination.



Figure S9. (a, b and c) DPVs of soybean pod extract (unknown concentrations) containing methyl salicylate, (d to g) are the additions of $6x10^{-4}$, $1.1x10^{-3}$, $2.1x10^{-3}$ and $2.8x10^{-3}$ M methyl salicylate. (a') DPV of AuNP-SPCE in the absence of methyl salicylate.

Added (µA)	Found (µA)	Recovery (%)	RSD (%)
8.0	8.4	106	10
39.1	49.4	126	-
75.2	90.3	120	-
139.9	151.4	108	-
245.4	233.0	95	-

Table S2. Real sample studies of methyl salicylate present in the soybean pod extract.