Supporting Information

Effect of nanostructures of Au electrodes on the electrochemical detection of As

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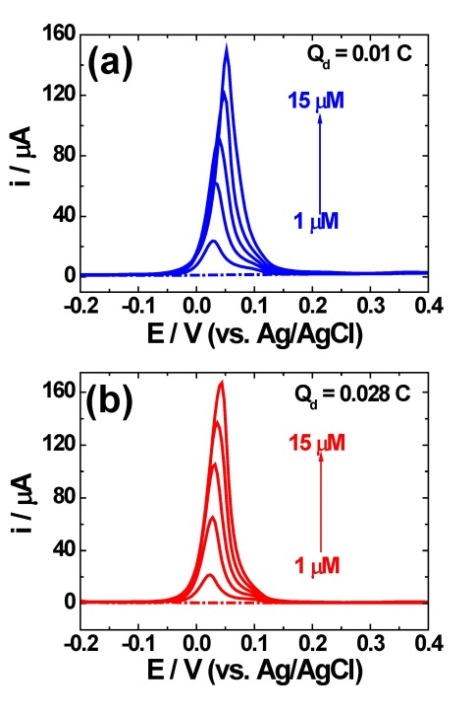
**Table S1**. Electrochemical surface area (ESA) and normalized currents (*I*norm) for As detection on various Au nanostructures with different deposition charges (Qd)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Electrodes | | | | | | | | |
| Nanoplate Au | | | **Dendritic Au** | | | **Nanospike Au** | | |
| Qd  (C) | **ESA**  **(cm2)** | ***I*norm**  **(µA/cm2)** | **Qd**  **(C)** | **ESA (cm2)** | ***I*norm**  **(µA/cm2)** | **Qd**  **(C)** | **ESA (cm2)** | ***I*norm**  **(µA/cm2)** |
| 0.01 | 0.256 | 225.13 | 0.005 | 0.158 | 106.83 | 0.0025 | 0.104 | 172.24 |
| 0.019 | 0.294 | 261.45 | 0.008 | 0.211 | 99.38 | 0.005 | 0.149 | 164.86 |
| 0.028 | 0.313 | 216.18 | 0.014 | 0.454 | 74.43 | 0.01 | 0.143 | 131.33 |
|  |  |  | 0.025 | 0.484 | 63.56 | 0.02 | 0.307 | 97.57 |

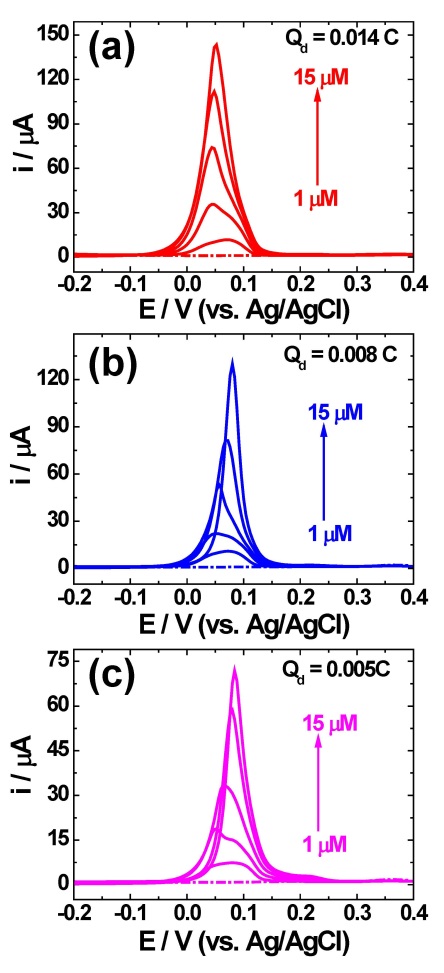
**Table S2**. The relative ratio of (111) and (100)/(110) Au facets on nanostructured Au electrodes

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Electrodes | | | | | | | |
| **Flat Au** | | **Nanoplate Au** | | **Dendritic Au** | | **Nanospike Au** | |
| (111) | (110)/(100) | (111) | (110)/(100) | (111) | (110)/(100) | (111) | (110)/(100) |
| Charges for Pb stripping (µC) | 1.84 | 2.83 | 18.1 | 5.86 | 9.23 | 19 | 5.18 | 7.04 |
| Ratio of  (111) over (100)/(110) | 0.65 | | 3.09 | | 0.49 | | 0.74 | |

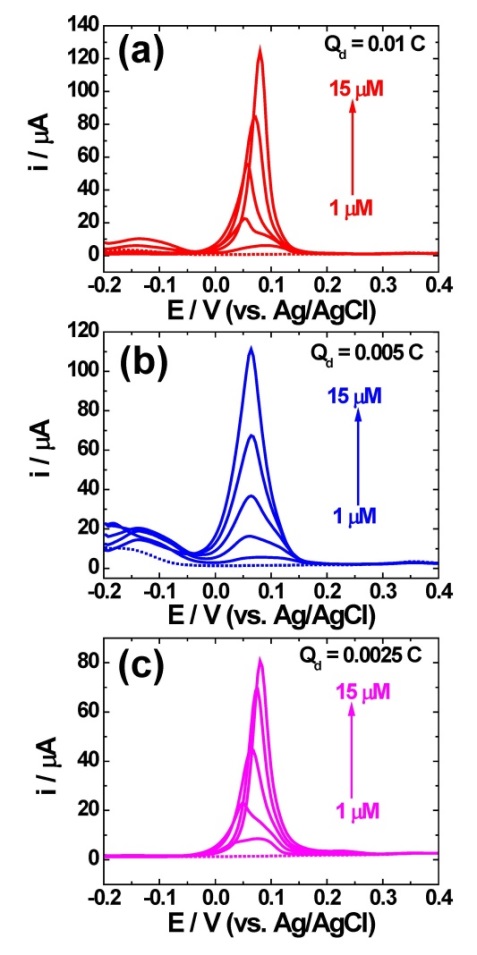
The stripping charges were measured by integrating the area under the anodic peaks during Pb UPD process as shown in Figure 3.



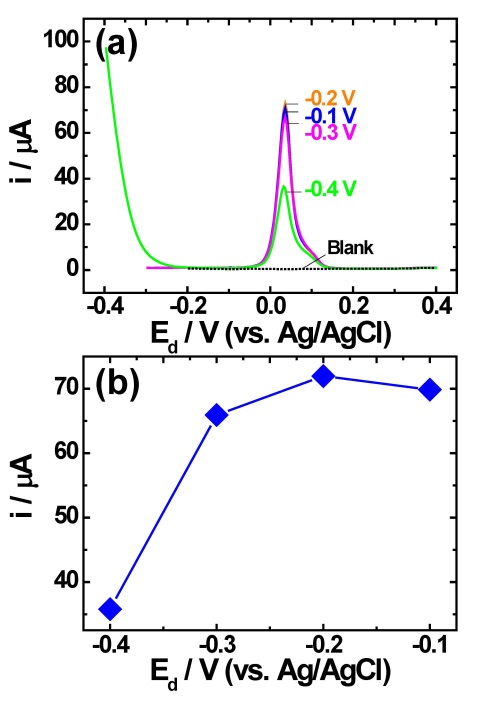
**Fig. S1.** SWASV of nanoplate Au electrodes at 1, 3, 6, 10, and 15 µM As(III) in 1 M HCl.



**Fig. S2**. SWASV of dendritic Au electrodes at 1, 3, 6, 10, and 15 µM As(III) in 1 M HCl.



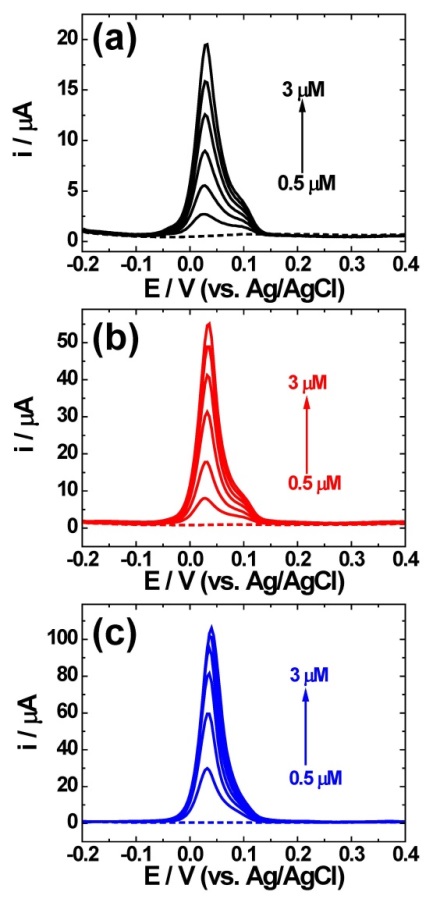
**Fig. S3.** SWASV of nanospike Au electrodes at 1, 3, 6, 10, and 15 µM As(III) in 1 M HCl.



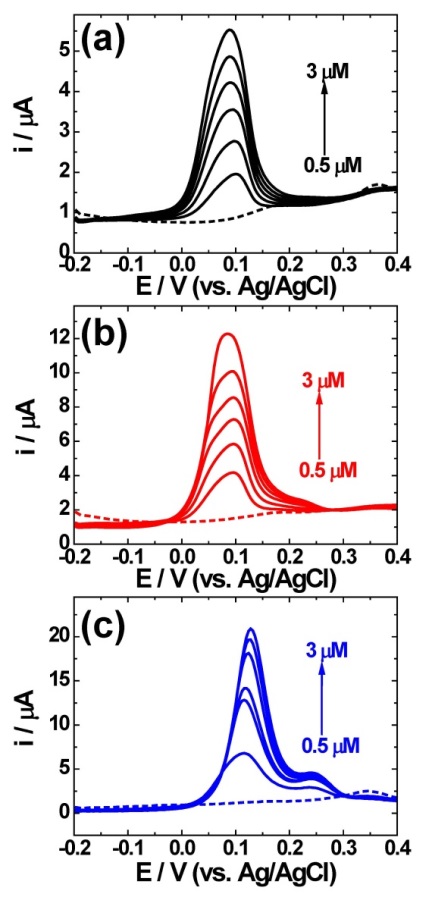
**Fig. S4.** (a) SWASV response of nanoplate Au electrode in 3 µM As(III) + 1 M HCl at various deposition potentials with deposition time of 150 s. (b) Peak current vs. deposition potential curve.

**Table S3.** Comparison of the differences in sensitivity between flat Au and nanoplate Au electrodes at a deposition time of the 50 s, 150 s, and 400 s.

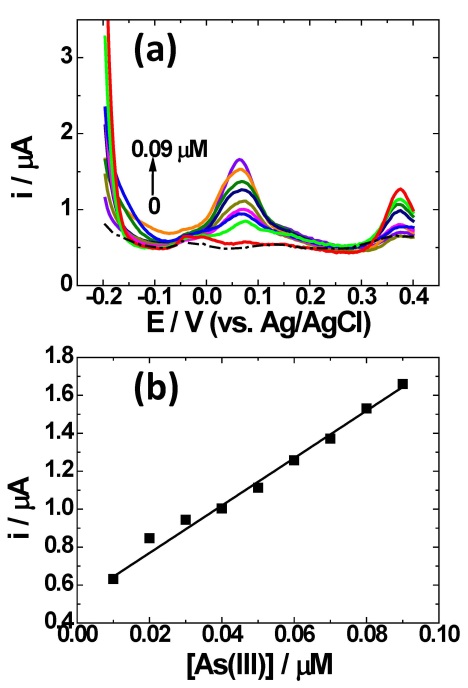
|  |  |  |  |
| --- | --- | --- | --- |
| Pre-deposition  time (s) | Sensitivity (µA/µM) | | Sensitivity ratio  Nanoplate over flat |
| Flat Au | Nanoplate Au |
| 50 | 1.4 ± 0.03 | 6.71 ± 0.12 | 4.79 |
| 150 | 3.1 ± 0.12 | 19.26 ± 1.2 | 6.21 |
| 400 | 5.4 ± 0.71 | 43.08 ± 5.1 | 7.97 |



**Fig. S5**. SWASV of nanoplate Au electrodes to As(III) standard solutions in 1 M HCl (a) at a deposition time of 50 s, (b) at 150 s and (c) at 400 s.

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**Fig. S6.** SWASV response of flat Au electrodes to various As(III) standard solutions in 1 M HCl with pre-deposition time of (a) 50 s, (b) 150 s, and (c) 400 s.



**Fig. S7.** (a) SWASV responses and (b) calibration plots for As detection on nanoplate Au electrodes for the evaluation of the detection limit.