# Supporting Information (SI)

# A novel biosensor for silver(I) ion detection based on nanoporous gold and duplex–like DNA scaffolds with anionic intercalator

Yaoyu Zhou [ab], Lin Tang*[ab], Guangming Zeng*[ab], Jingjing Zhu [ab], Haoran Dong [ab], Yi Zhang [ab], Xia Xie [ab], Jiajia Wang [ab], Yaocheng Deng [ab]

a College of Environmental Science and Engineering, Hunan University, Changsha, 410082, China,

b Key Laboratory of Environmental Biology and Pollution Control (Hunan University), Ministry of Education, Changsha 410082, Hunan, PR China.

*

Total number of pages of Supporting Information: 5 (including cover page)

Number of Figures in Supporting Information: 2

Number of Tables in Supporting Information: 2

* Corresponding author: Tel.: +86–731–88822778; Fax.: +86–731–88822778

E–mail: tanglin@hnu.edu.cn(L. Tang), zgming@hnu.edu.cn (G.M. Zeng).

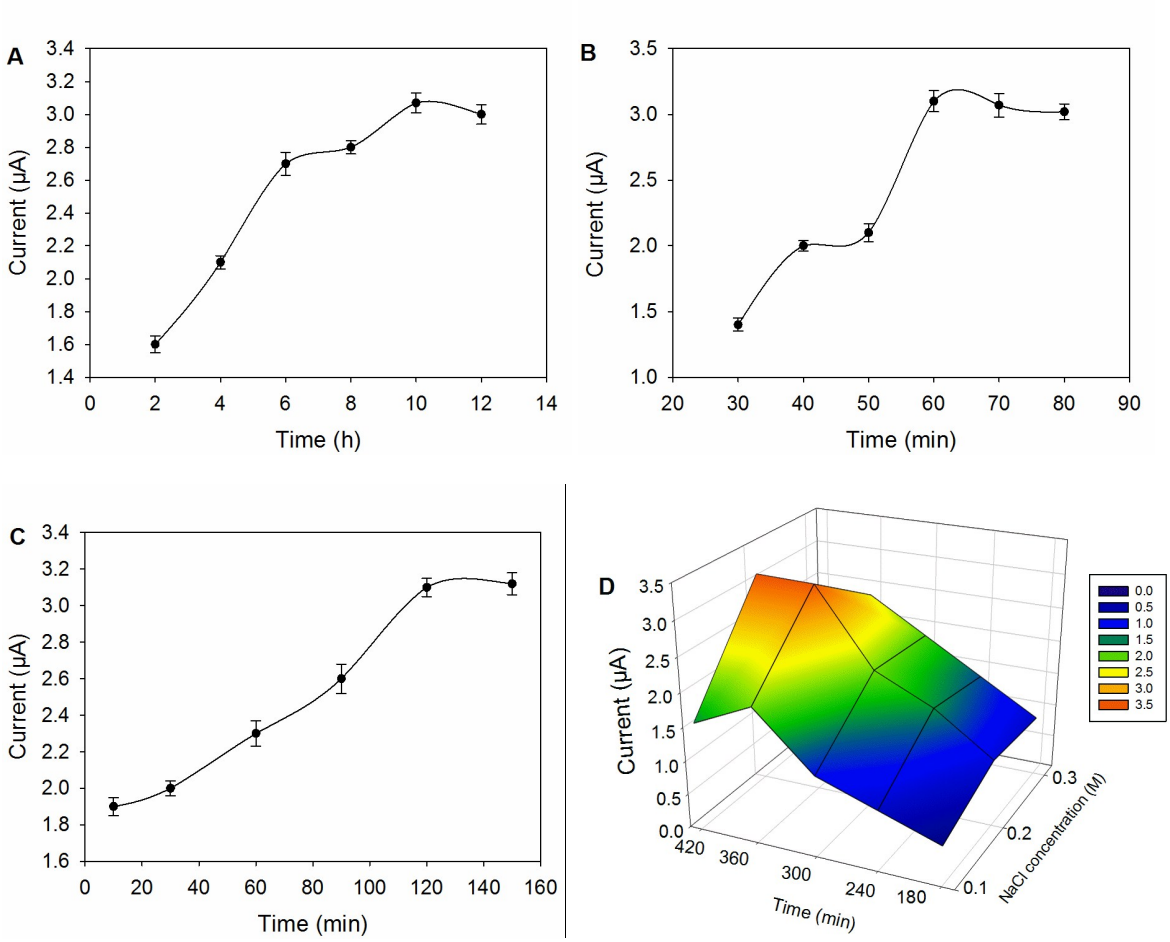


**Fig. S–1.** Optimization of experimental conditions: (A) Effect of the self–assembly time of capture probe; (B) Effect of the hybridization time of (S2+S3); (C) Effect of the time–course of the $Ag^{+}$ hybridized with C bases; (D) Effect of the salt concentration and immersing time to AQDS intercalating; All tested electrodes were fabricated by immobilizing 2 μL capture probe on electrodes surfaces at 4 ◦C. Error bars indicate standard deviations from three replicative tests.

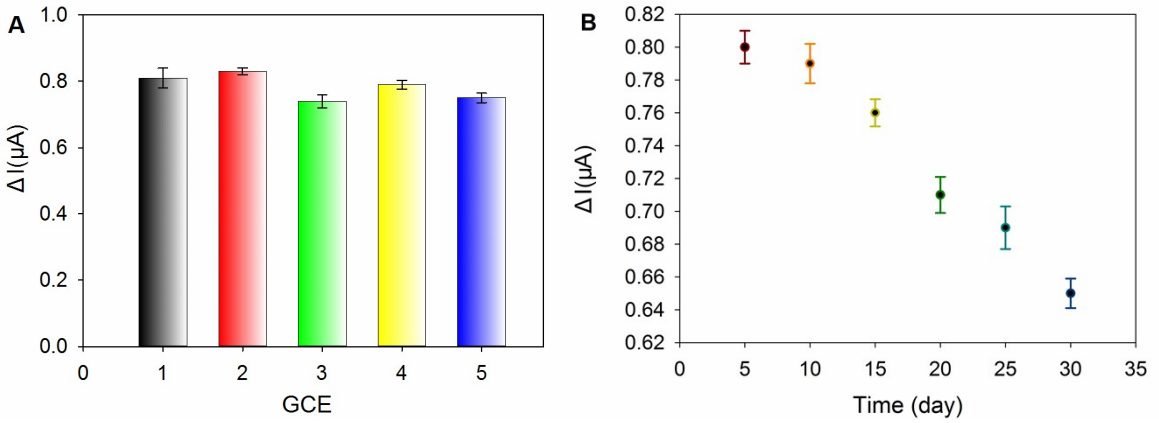


**Fig. S–2. (A)**Five different GCEs constructed by the same procedure on response of biosensor for $Ag^{+}$ ($10^{-8}$ M), (B) Stability of the biosensor in detecting $10^{-8}$ M $Ag^{+}$ solution. Error bars indicate standard deviations from three replicative tests.

**Table S–1** Equivalent circuit element values for the films in Fig. 3C[a]

| Equivalent circuit elements | | | | |
|---|---|---|---|---|
| electrode | $R_{CT}$(Ω) | $R_S$ (Ω) | $C_{dl}$(μF) | $W$(mΩ/s$^{1/2}$) |
| GCE | 760.0 (±3) | 154.7(±4.5) | 4.024(±0.5) | 1.504(±0.052) |
| GCE/NPG | 19.9(±2) | 140.5(±1.5) | 3.368(±0.38) | 1.580(±0.064) |

[a]The values in parentheses represent the standard deviations from at least 3 electrode measurements.

**Table S–2** $Ag^+$ ions in environmental samples determined by this sensor and atomic absorption spectroscopy (AAS).

| Sample number of Taozi Lake | Addition concentration of $Ag^+$ (nM) | Biosensor (mean[a] ± SD[b]) (nM) | atomic absorption spectroscopy (AAS) (mean[a] ± SD[b]) (nM) | Relative Standard Deviation (%) |
|---|---|---|---|---|
| **1** | 65 | 64.12±3.5 | 66.89±4.3 | 2.99 |
| **2** | 5 | 5.15±0.3 | 4.91±0.21 | 3.37 |
| **3** | 20 | 21.35±1.1 | 21.92±1.5 | 1.86 |
| **4** | 150 | 153.26±4.2 | 157.03±3.9 | 1.72 |

[a] An average of three replicate measurement. [b]SD =standard deviation