Supporting Information (SI)

Sensitive impedimetric biosensor based on duplex–like DNA scaffolds and ordered mesoporous carbon nitride for silver(I) ion detection

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Number of Scheme in Supporting Information: 1

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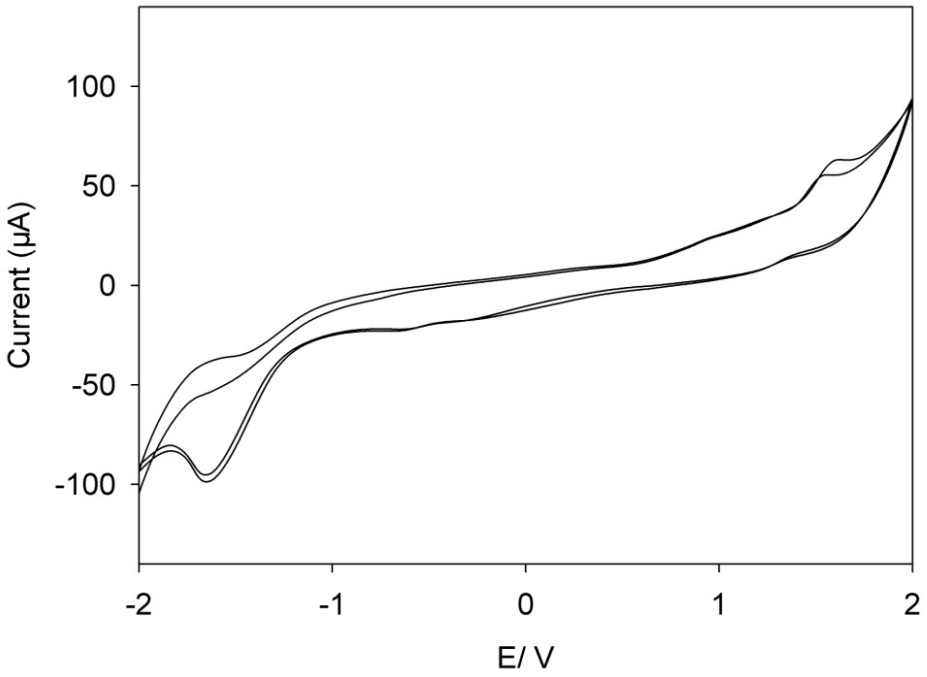


Fig. S–1 The preparation of GCE/L–Lys: the GCE was scanned by cyclic voltammetry (CV) in 1.0 × 10^{-3} M L–Lysine between –2.0 and 2.0 V at 50 mV·s^{-1}.

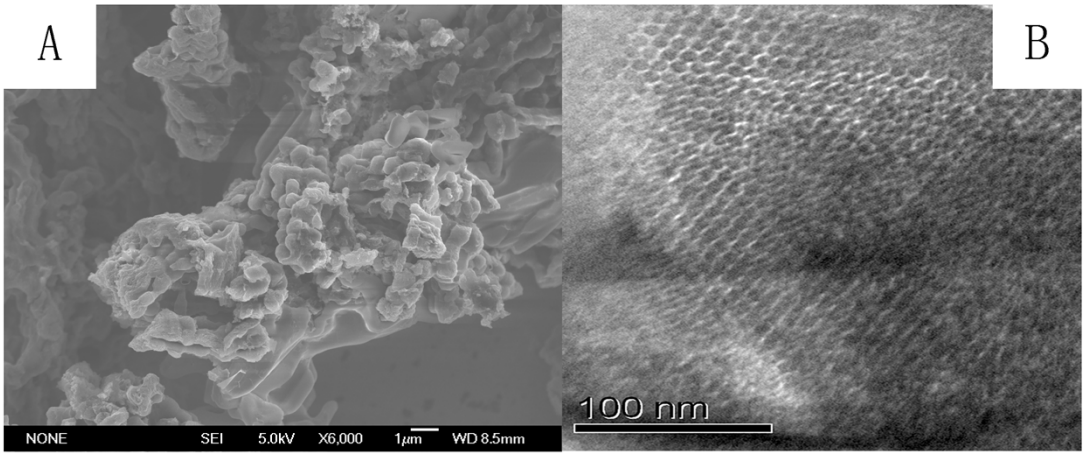


Fig. S–2 (A) SEM image of MCN. (B) TEM image of MCN.

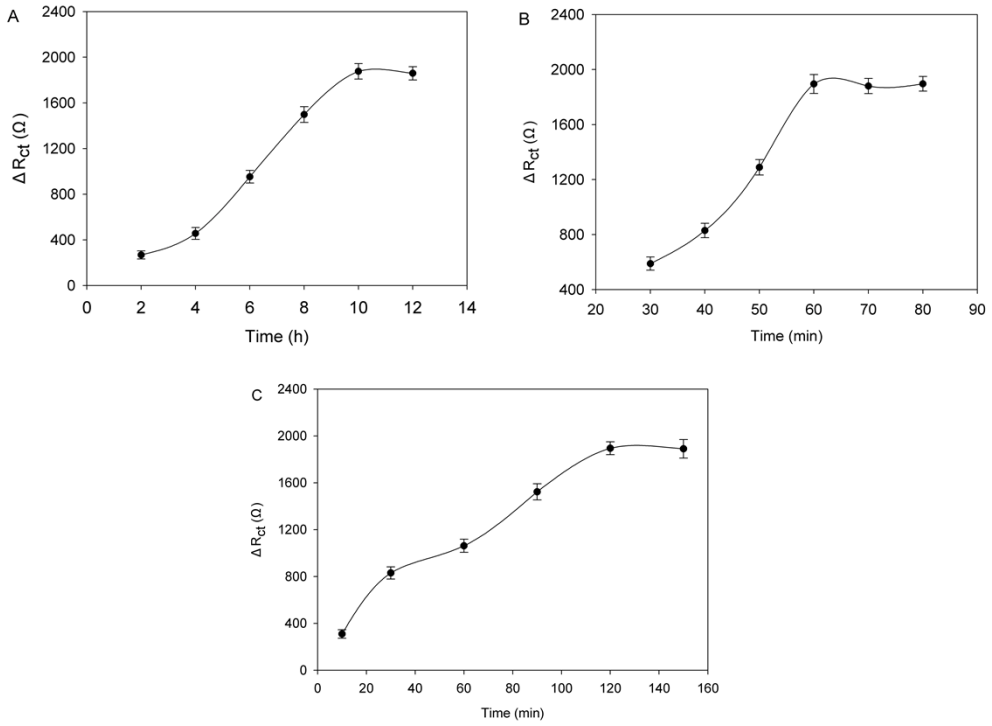


Fig. S–3 Optimization of experimental conditions: (A) the effect of self–assembly time (capture probe); (B) the effect of hybridization time (S2+S3); (C) the time–course of the Ag^{+} hybridized with C bases; All tested electrodes were fabricated by immobilizing 10 μL capture probe on electrodes surfaces at 4 ◦C. Error bars indicate standard deviations from three replicative tests.

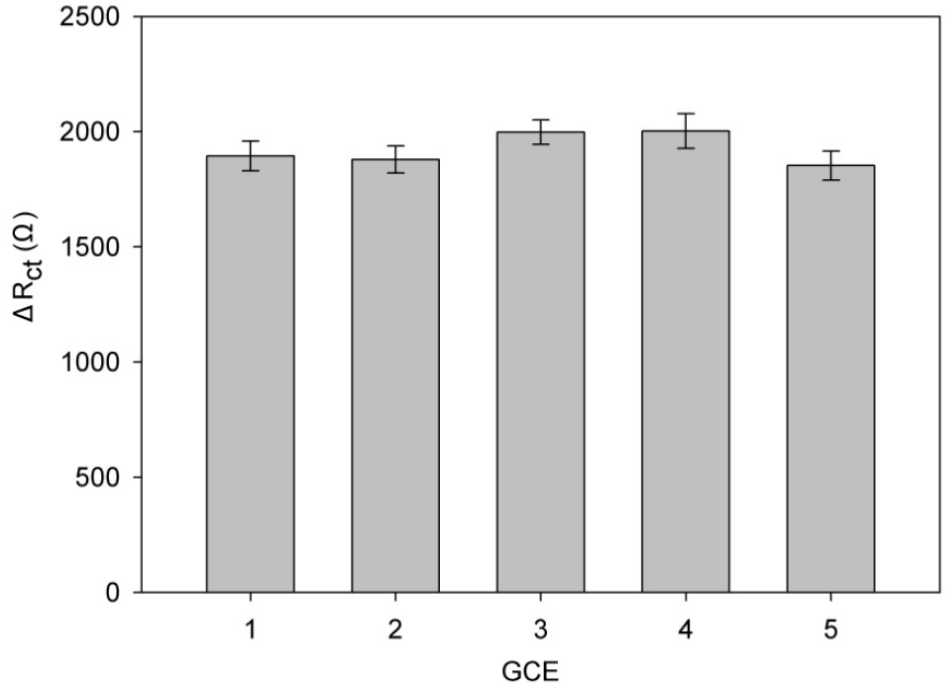
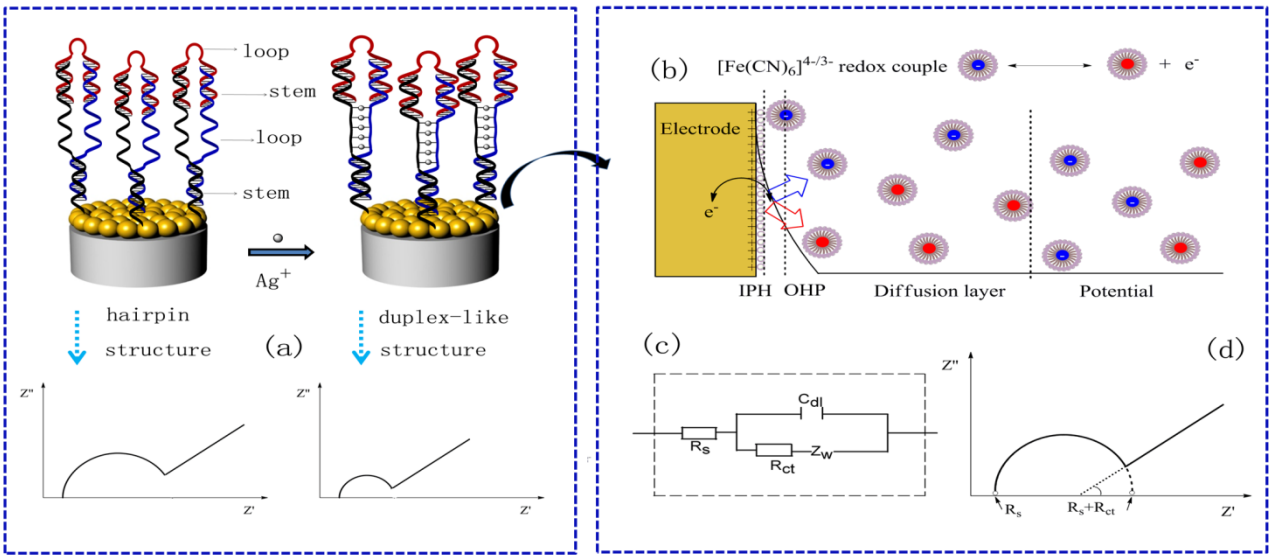


Fig. S–4 Five different GCEs constructed by the same procedure on response of biosensor for Ag^{+} (10^{-8} M). Error bars indicate standard deviations from three replicative tests.



Scheme. S–1 The mechanism of the biosensor including (a) the DNA structure changed in the absence of Ag^{+}, (b) Schematic diagram for an electrode/electrolyte interface in a Faradaic biosensor[1,2], (c) Randles' equivalent circuit: R_s is the Ohmic resistance of the electrolyte; R_{ct} is the polarization resistance; Z_w is Warburg impedance; and C_{dl} is the double layer capacitance. The measured EIS data can be simulated with this equivalent circuit[1,2] , (d) Typical Nyquist plot of reactive (Z'') versus resistive (Z') part of the complex impedance[1,2] .

Table S–1 Equivalent circuit element values for DNA films in absence and presence of Ag^+ in Fig. 4A

Equivalent circuit element values for DNA films in absence and presence of Ag^+ [a]					
	Equivalent circuit elements				
	R_{ct} (Ω)	R_S (Ω)	C_{dl} (μF)	W(mΩ/s$^{1/2}$)	ΔR_{ct} (Ω)
before hybridization with DNA	101.6(±7)	111.8(±9.3)	11.47(±0.6)	1.456(±0.096)	–
after hybridization with DNA	3768.0(±94)	106.9(±1.9)	3.592(±0.10)	0.733(±0.051)	–
1×10^{-5} M	641.4(±29)	110.9(±2.1)	3.670(±0.18)	1.139(±0.068)	3127.0(±109)
1×10^{-6} M	831.1(±35)	114.0(±2.2)	2.972(±0.10)	1.182(±0.083)	2936.9(±114)
1×10^{-7} M	1080.0(±68)	107.6(±2.8)	3.895(±0.21)	1.016(±0.047)	2688(±92)
1×10^{-8} M	1825.0(±52)	112.4(±3.4)	3.263(±0.19)	1.111(±0.059)	1943(±113)
1×10^{-9} M	2578.0(±46)	108.7(±2.1)	3.802(±0.22)	0. 942(±0.061)	1190(±82)
1×10^{-10} M	2841.0(±89)	113.9(±3.1)	4.460(±0.25)	0.082(±0.040)	927(±56)

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

Table S–2 Determination of Ag^+ ions added in real samples with the proposed sensor.

Sample number of Xiangjiang River	Added (nM)	Founded [a] (nM)	Recovery (%)
1	0.5	0.529	105.80
2	5	4.760	95.20
3	50	51.43	102.86
4	500	491.96	98.39
5	5000	4948.55	98.97

[a] An average of three replicate measurement.

References

1 J. Y. Park and S. M. Park, Sensors, 2009, **9**, 9513–9532.

2 S. M. Park and J. S. Yoo, Analytical chemistry, 2003, **75**, 455 A–461 A.