Electronic Supplementary Information (ESI) for Analyst

This journal is (c) The Royal Society of Chemistry 2023

Dual cascade nucleic acid recycling-amplified assembly of hyperbranched DNA nanostructures to construct a novel plasmonic colorimetric biosensing method

Xinyue Yuwen,[a] Yingzhao Zeng,[a] Shilong Ruan,[b] Xin Li[a] and Guosong Lai*[a]

[a] *Hubei Key Laboratory of Pollutant Analysis & Reuse Technology, College of Chemistry and Chemical Engineering, Hubei Normal University, Huangshi 435002, China*

[b] *Daye Public Inspection and Test Central, Daye 435100, China*

* Corresponding author.

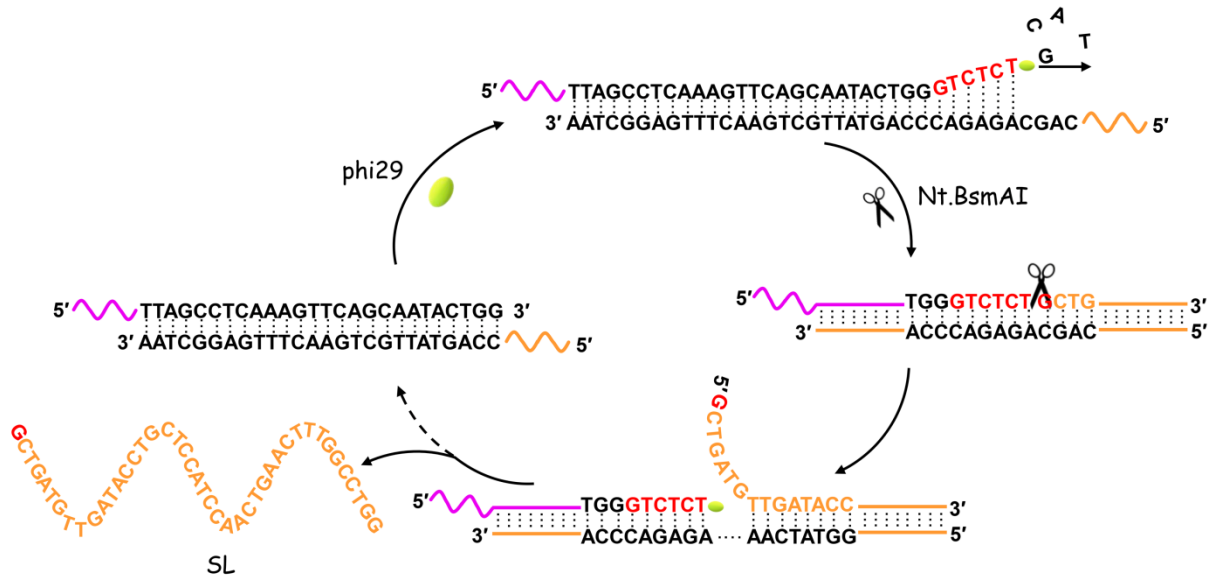 *E-mail address*: gslai@hbnu.edu.cn (G. Lai)

 Phone: +86-714-6515602.

Fig. S1 Schematic illustration of the working principle of the phi29-assisted cleavage reaction of Nt.BsmAI for releasing the SL strand.
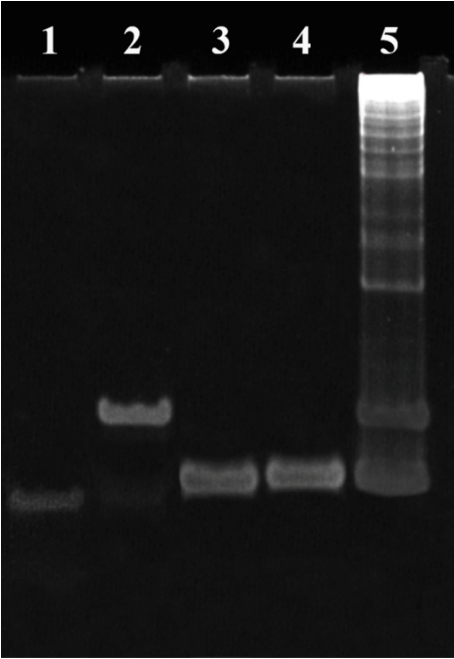

Fig. S2 PAGE assay results of different samples: lane 1, SL; lane 2, SC + SL; lane 3, H4; lane 4, H5; lane 5, SC + SL + H4 + H5.
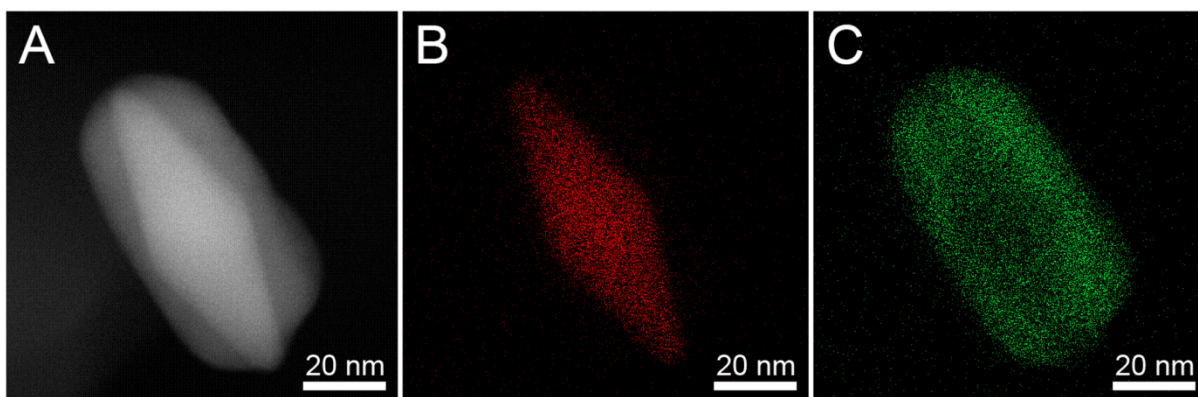
Fig. S3 High-magnification HRTEM image of the typical Au NBP/Ag nanocomposite produced from the target biorecognition-induced silver deposition reaction (A), and its EDS mapping images of the gold (B) and silver (C) elements.
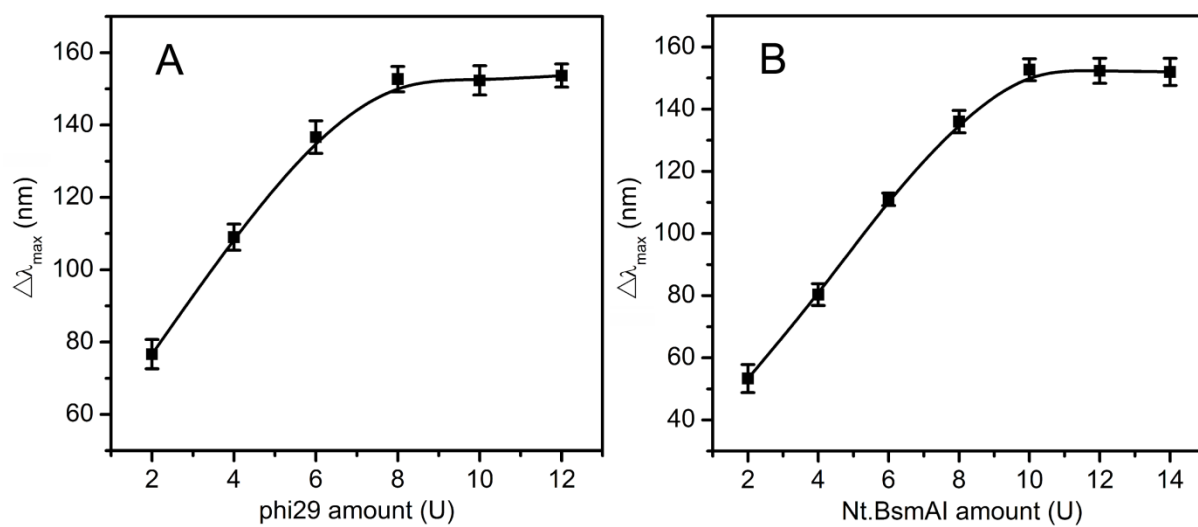

Fig. S4 Effects of the amounts of (A) phi29 and (B) Nt.BsmAI on the $\Delta\lambda_{max}$ response induced by the target biorecognition reaction of 1 ng mL^{-1} Kana.
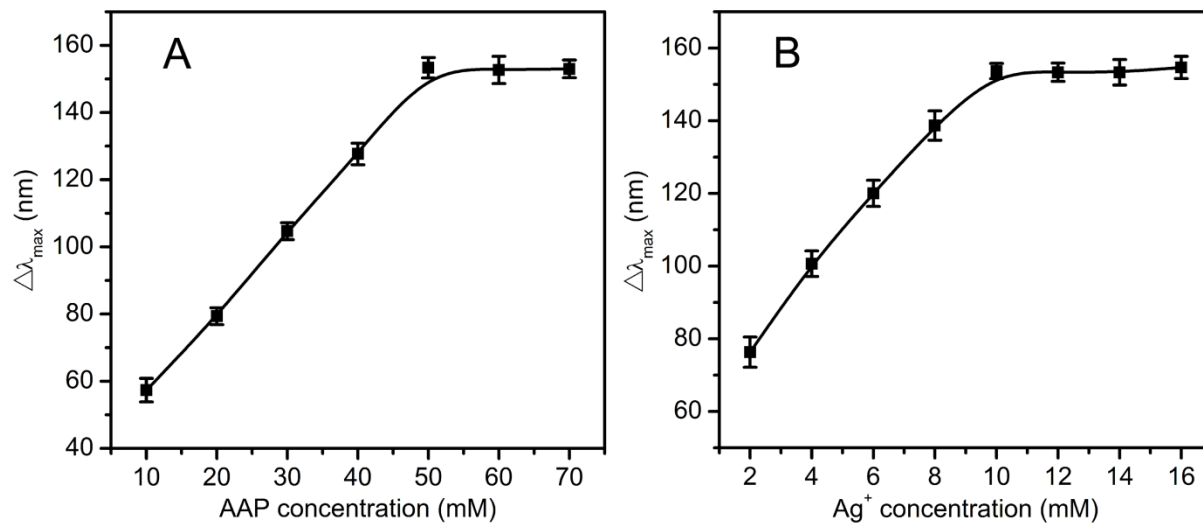
Fig. S5 Effects of the concentrations of (A) AAP and (B) Ag^+ on the $\Delta\lambda_{max}$ response induced by the target biorecognition reaction of 1 ng mL^{-1} Kana.

Table S1. The overview of the main characteristics and analytical performances of the proposed method to compare with the reference methods reported previously.

Signal transduction strategy	Detection method	Detection time (min)	Linear range	LOD	Ref.
Target biorecognition-triggered HCR to cause salt-induced aggregation of gold nanoparticles	Colorimetry	345	1–40 μM	0.68 μM	15
Target biorecognition-triggered catalytic hairpin assembly (CHA) and DNA walking to produce reverse signal change	Fluorescence	205	50 pM–2 nM	21.7 pM	28
Target biorecognition-triggered CHA and HCR to yield branched DNA complexes with active G-quadruplex structures	Fluorescence	145	0.1–300 nM	46.1 pM	32
Target biorecognition-triggered assembly of G-quadruplex-decorated DNA nanotrees	Colorimetry	165	0.1 pg mL^{-1}–10 ng mL^{-1}	28 fg mL^{-1}	33
Target biorecognition to release $CoFe_2O_4$ nanozymes from a methylene blue-based aptasensor	Electrochemistry	60	1 pM–1 μM	0.5 pM	39
DNase I-assisted target biorecognition recycling to desorb aptamer from graphene and output potentiometric signal	Electrochemistry	60	0.05–30 pM	0.05 pM	40
Target biorecognition to inhibit the terminal deoxynucleotidyl transferase-amplified linking of enzyme labels	Colorimetry	145	0.01–500 nM	9 pM	41
Target biorecognition-triggered assembly of hyperbranched DNA nanostructures to induce silver deposition at Au NBPs	Colorimetry	300	10 fg mL^{-1}–1 ng mL^{-1}	1.4 fg mL^{-1}	This work

Table S2 The results on the recovery tests of Kana added in a milk and a honey sample by this method and the ELISA kit (n=5).

Sample	Add (pg mL^{-1})	Found (pg mL^{-1}, ± SD)	Recovery (%)	ELISA (ng mL^{-1}, ± SD)	Recovery (%)
Milk	1	1.056±0.024	105.6	NA	/
	10	10.32±0.23	103.2	NA	/
	100	99.27±2.4	99.3	96.44±5.6	96.44
	500	509.4±20	101.9	512.0±19	102.4
Honey	1	0.9591±0.033	95.9	NA	/
	10	10.28±0.33	102.8	NA	/
	100	104.2±2.6	104.2	98.94±6.4	98.94
	500	493.2±14	98.6	527.6±17	105.5