Supplementary Information for

Mercury Mediated DNA-Au/Ag Nanoclusters Ensemble to Generate Gray Code Encoder for Biocomputing

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Figures and tables:

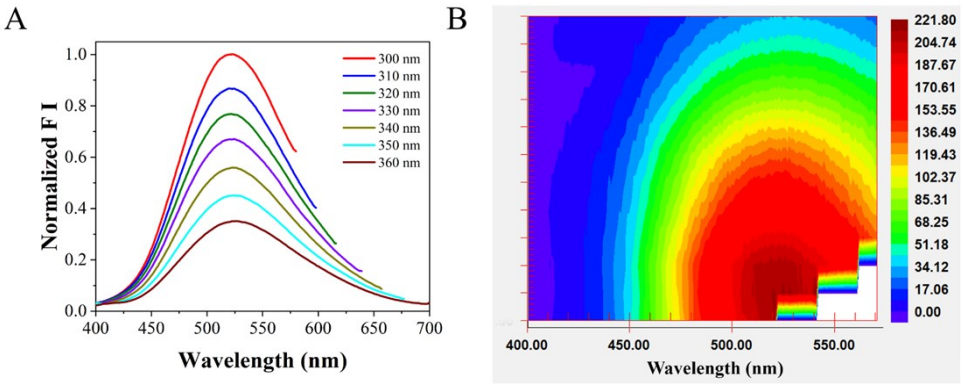

Fig. S1 (A) Normalized fluorescence studies and (B) contour plot representation of DNA-Au/Ag NCs at different excitations ranging from 300 nm to 360 nm.

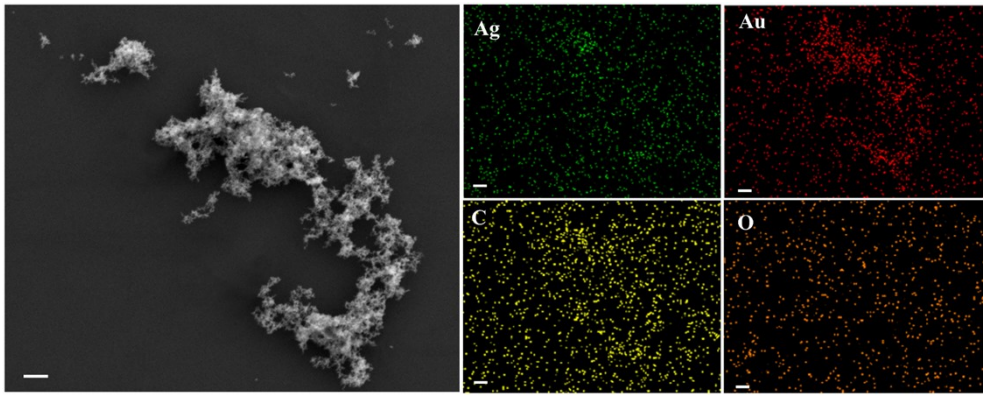

Fig. S2 FE-SEM image and elemental mapping of Ag, Au, C, and O for the synthesized DNA-Au/Ag NCs with 200 nm scale bar.

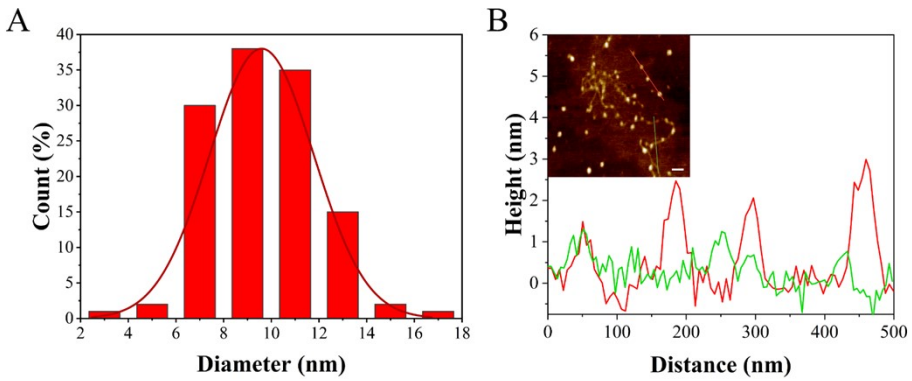

Fig. S3 (A) Size distribution analysis of DNA-Au/Ag NCs. (B) AFM image height profiles for the corresponding to templated effect of DNA architecture (green line) and DNA-Au/Ag NCs (red line). [scale bar for inset image: 100 nm]

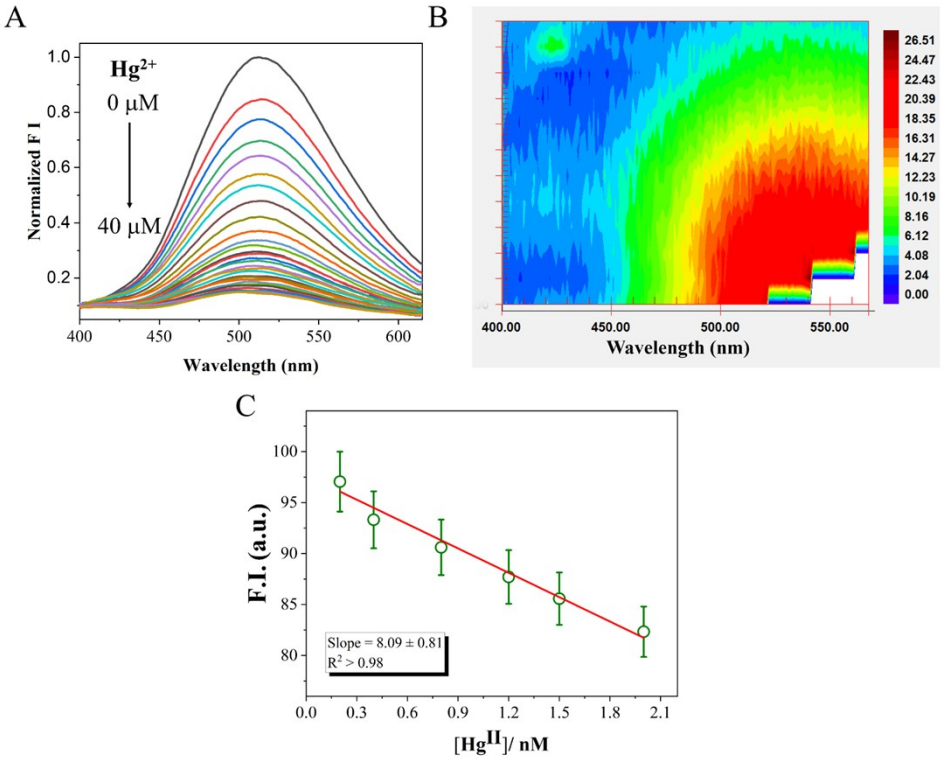

Fig. S4 (A) Fluorescence quenching studies and (B) contour plot representation of DNA-Au/Ag NCs versus Hg^{II} at different concentrations. (C) Plot of fluorescence intensity (F.I.) versus [Hg^{II}] (linear portion considered)

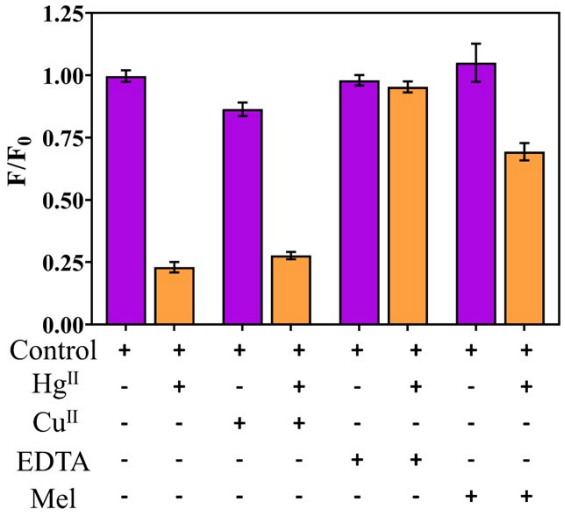

Fig. S5 A comparison study between DNA-Au/Ag NCs (control) and M-Au/Ag NCs formation with different analytes such as Cu^{II}, EDTA, and Mel.

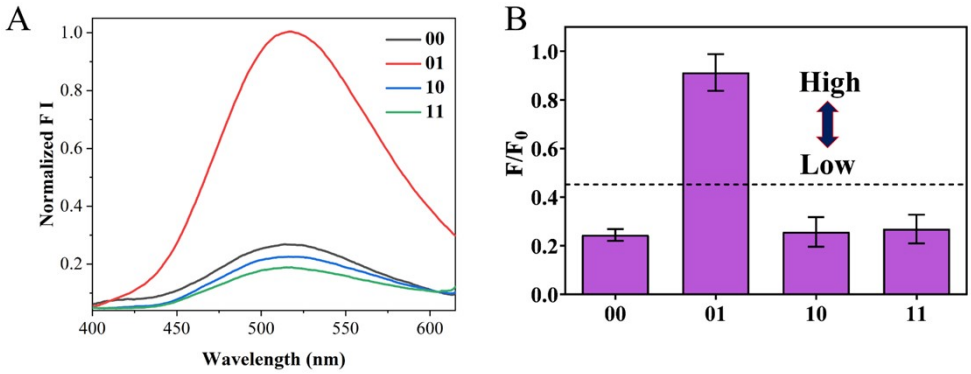

Fig. S6 (A) Normalized fluorescence emission spectra and (B) column bar of replica data for M-Au/Ag NCs under four different entries of the 3-bit even pG; 00 input none, 01 input D2 (EDTA), 10 input D1 (Cu^{II}), 11 input the mixture of D2 & D1 (Cu^{II} and EDTA) with M-Au/Ag NCs.

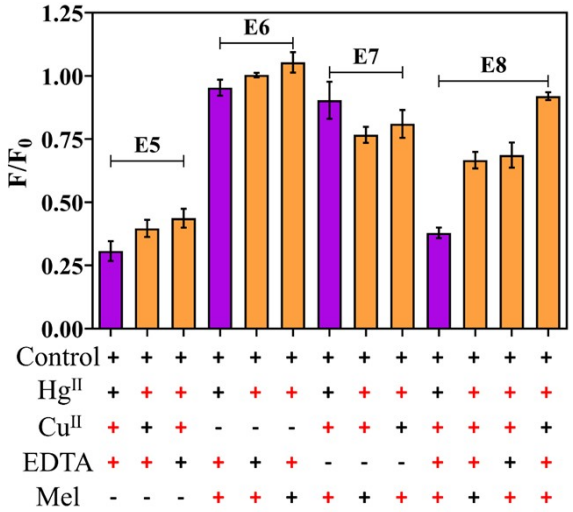

Fig. S7 The study of fluorescence spectra in order of the addition or preincubation of M-Au/Ag NCs in the presence of Mel (P = 1) with different analytes (E5 – Mel, E6 – Mel + EDTA, E7 – Mel + Cu^{II}, E8 – Mel + Cu^{II} + EDTA). The "+" (plus icon in red color) in Y-axis represents analytes in order of addition for preincubation.

Table S1. FE SEM elemental mapping obtained the weight percentage of elements present in the DNA-Au/Ag nanocluster.

Name	Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Standard Label	Factory Standard
b	Ag	L series	0.12	0.00115	13.56	2.13	Ag	Yes
c	Au	M series	0.19	0.00190	19.82	2.28	Au	Yes
d	C	K series	0.28	0.00283	52.67	3.02	C Vit	Yes
e	O	K series	0.07	0.00023	13.94	3.41	SiO2	Yes
	Total:				100.00			

Table S2. (A) Truth table of the 2-bit even Un-pG (D1' = Cu^{II}, D2' = EDTA, [a] number of 1's in the D1D2P string for $P = 0$, B fluorescent intensity of DNA-Au/Ag NCs ensemble, G gray code converted outputs). (B) Illustration of B to G conversion using XNOR operation.

A

Entry	Input		Output		∑ [a]
	D1	D2	B	G	
1	0	0	0	0	0, even
2	0	1	1	1	2, even
3	1	0	0	1	2, even
4	1	1	0	0	2, even

B

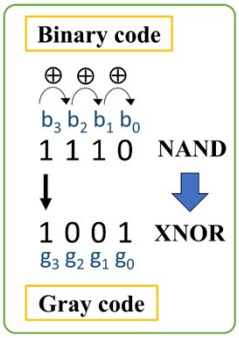

Table S3. The 4-bit binary to gray code conversion table is as follows. The binary and gray codes employed are displayed in red.

Decimal Number	4-bit Binary Code	4-bit Gray Code
	$b_3b_2b_1b_0$	$g_3g_2g_1g_0$
0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	**0100**	**0110**
5	0101	0111
6	0110	0101
7	0111	0100
8	1000	1100
9	1001	1101
10	1010	1111
11	1011	1110
12	1100	1010
13	1101	1011
14	**1110**	**1001**
15	1111	1000