

# A Spherical Nucleic Acids Platform Based on Self-Assembled DNA Biopolymer for High Performance Cancer Therapy

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## Supporting Materials: figures and table

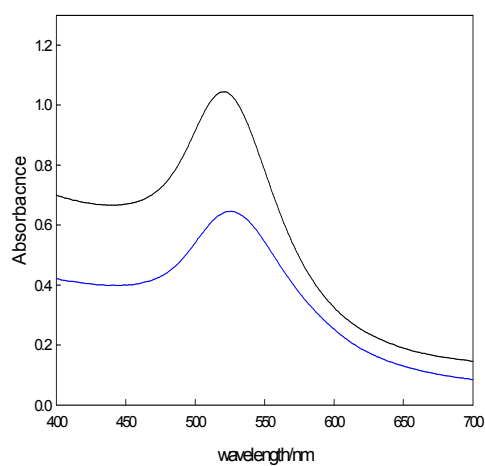
**Table S1.** Oligonucleotides Used in This Work\*

Entry	Sequence (5'-3')
Initiator Strand	TGCTGCTGCTGCTGCTGCACGACG AAAAAA
M1	CGTCGTGCAGCAGCAGCAGCAACGGCTTGCTGCTGCTGCTGCTGC
M2	TGCTGCTGCTGCTGCTGCACGACGGCAGCAGCAGCAGCAGCAAGCCGT
M3	<u>GGTGGTGGTGGTTGTGGTGGTGGTGGTTTCGTCGTGCAGCAGCAGCAGCAGCA</u> ACGGCTT GCTGCTGCTGCTGCTGC
M3-FITC	<u>GGTGGTGGTGGTTGTGGTGGTGGTGGTTTCGTCGTGCAGCAGCAGCAGCAGCAACGGCTT</u> GCTGCTGCTGCTGCTGC-FITC
M3-TMR	<u>GGTGGTGGTGGTTGTGGTGGTGGTGGTTTCGTCGTGCAGCAGCAGCAGCAGCAACGGCTTG</u> CTGCTGCTG CTGCTGC-TMR
Biotin-M3-FITC	Biotin- <u>GGTGGTGGTGGTTGTGGTGGTGGTGGTTTCGTCGTG</u> CAGCAGCAGCAGCAGCAACG GCTTCTGCTGCTGCTGCTGC -FITC
Biotin-M3-TMR	Biotin- <u>GGTGGTGGTGGTTGTGGTGGTGGTGGTTTCGTCGTGCAGCAGCAGCAGCAGCAACG</u> GCTTCTGCTGCTGC –TMR
M4	<u>GGTGGTGGTGGTTTT</u> TGCTGCTGCTGCTGCTGCACGACGGCAGCAGCAGCAGCAGCAAGC CGTTT <u>TGTGGTGGTGG</u> TGG
Sgc8 capped-Strand I-FITC	TGCTGCTGCTGCTGCTGCACGACG <u>TTTATCTAACTGCTGCGCCGCCGGGAAAATACTGTA</u> <u>CGGTTAGA</u> -FITC
Sgc8 capped-Strand II-FITC	<u>ATCTAACTGCTGCGCCGCCGGGAAAATACTGTACGGTTAGATT</u> TACGGCTTCTGCTGCTGCT GCTGCTGC-FITC

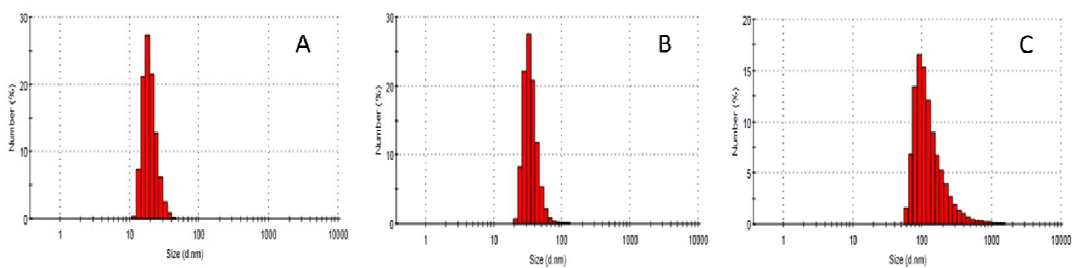
\* The AS1411 and Sgc8 fragments are represented in underlined portions. The complementary sequences are represented in the same color.

**Table S2.** The concentrations of conjugated initiator and self-assembled M1, M2 for each size of AuNP-SNAs.

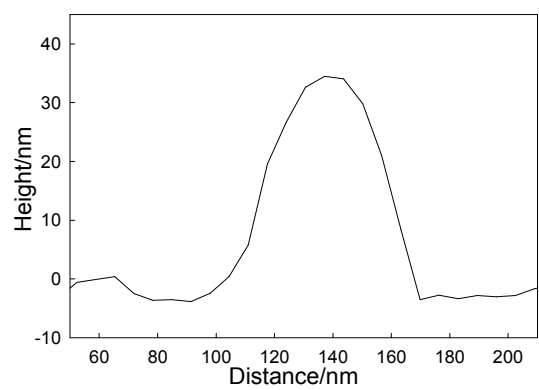
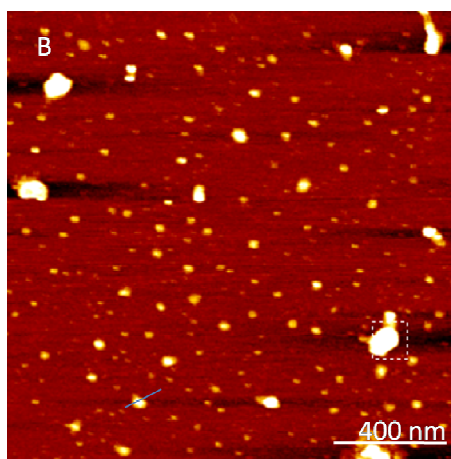
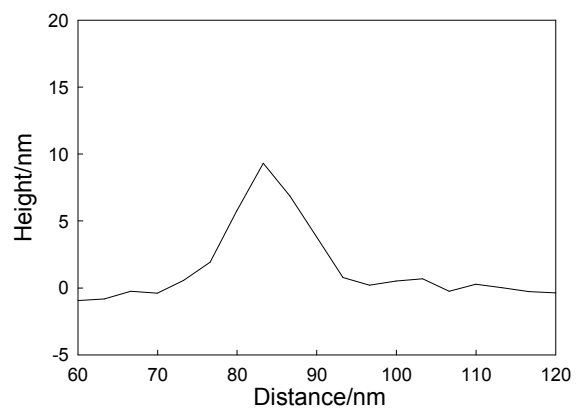
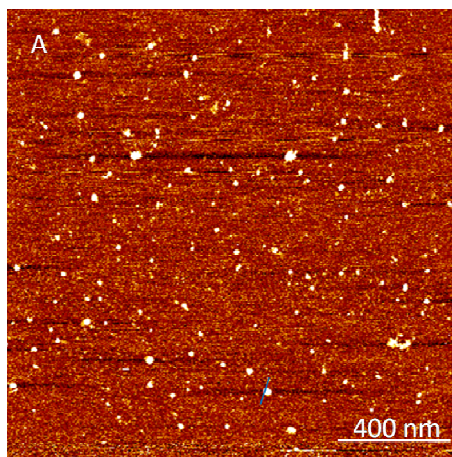
Size(nm)	Initiator(nM)	M1(nM)	M2(nM)
13.4 ± 1.2	0.0	0.0	0.0
19.0 ± 0.4	9.6 ± 1.2	8.7± 2.4	6.9± 1.8
42.5 ± 0.8	18.9 ± 0.8	41.2± 3.4	32.1± 1.5
112.3± 2.4	40.8 ± 1.3	210.4± 4.7	189.3± 2.5
130.4 ± 6.8	78.4 ± 3.4	312.8± 2.8	295.5± 2.7
110.4 ± 4.8	97.6 ± 4.2	368.7± 2.3	373.5± 1.9



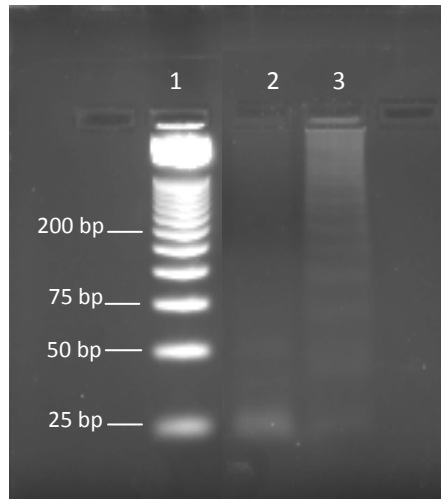
**Figure S1.** Absorption spectra of AuNPs and initiator strand before (black) and after (blue) conjugated.



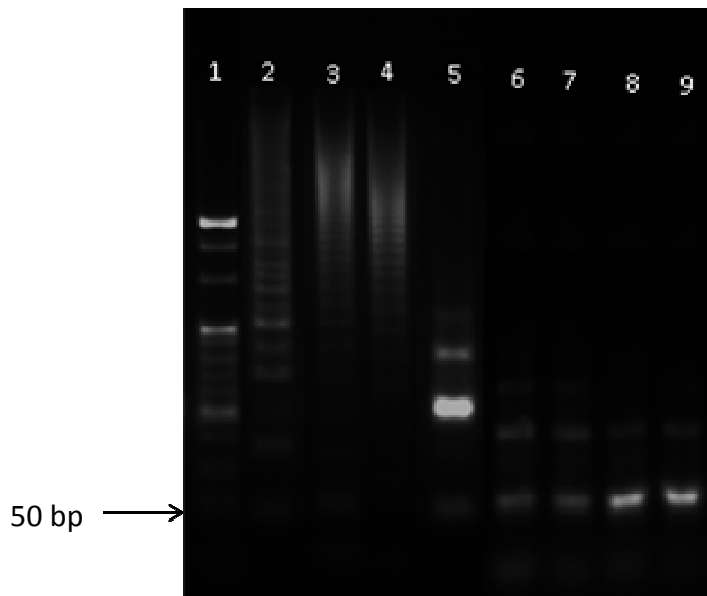
**Figure S2.** Hydrodynamic size distributions of AuNP-SNAs characterized by DLS as a function of different concentrations of initiator strand conjugated on the AuNPs. (The concentrations of initiator strand from A to C, 0,  $18.9 \pm 0.8$  and  $78.4 \pm 3.4$  nM, respectively).



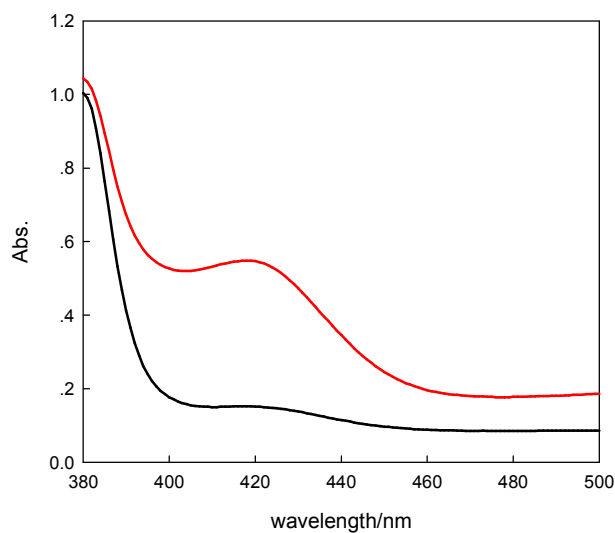
**Figure S3.** Topography AFM images and the corresponding height profiles of various sizes of AuNP-SNAs (A and B, the size are  $13.4 \pm 1.2$  and  $68.4 \pm 4.8$  nm, respectively). Scale bar: 400 nm.



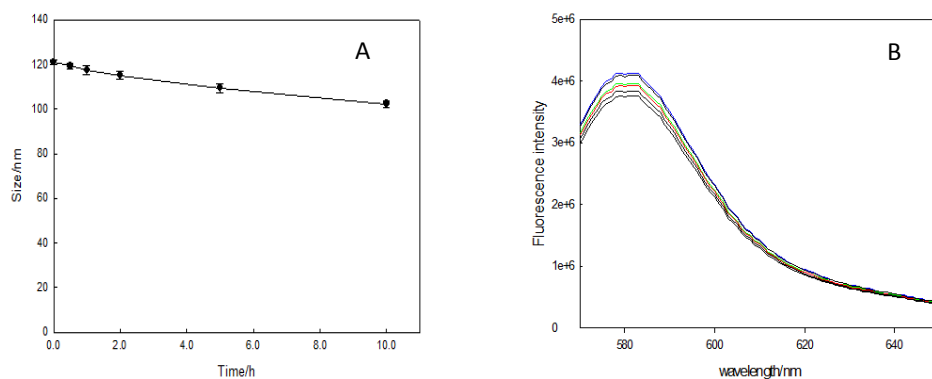
**Figure S4.** EB-stained 4% agarose gel electrophoresis image of DNA biopolymer self-assembled on the surface of the AuNPs after treatment by 10 mM DTT. Lane 1: 25 bp Marker; Lane 2: Initiator conjugated-AuNPs; Lane 3: Initiator-AuNPs+M1+M2. (Concentrations: initiator strand is 80 nM; M1 and M2 are 400 nM)



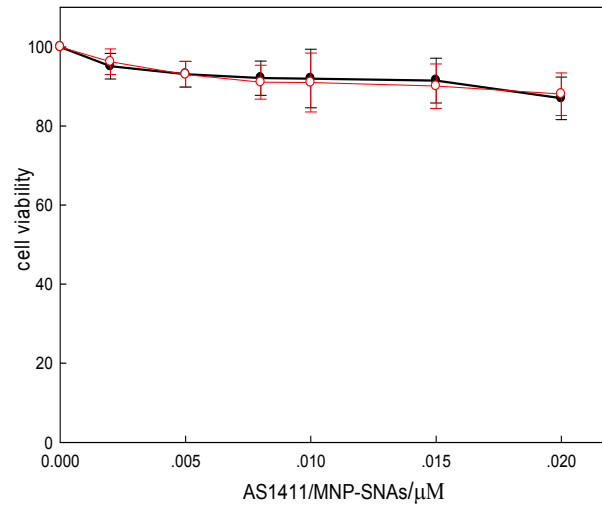
**Figure S5.** EB-stained 4% agarose gel electrophoresis image of DNA biopolymer self-assembled as a function of different location of AS1411. (Lane 2-5) Initiator strand cascade of hybridization reaction by initiator strand M2 and M3. (Lane 6-9) Initiator strand cascade of hybridization reaction by initiator strand M2 and M4. (Lane 1: 50 bp Marker; Lane 2 and 6: (Initiator strand: M2:M3/M4=0.5:10:10); Lane 3 and 7: (Initiator strand: M2: M3/M4=1:10:10); Lane 4 and 8: Initiator strand: M2: M3/M4=2:10:10); Lane 5 and 9: (Initiator strand: M2: M3/M4=5:10:10)).



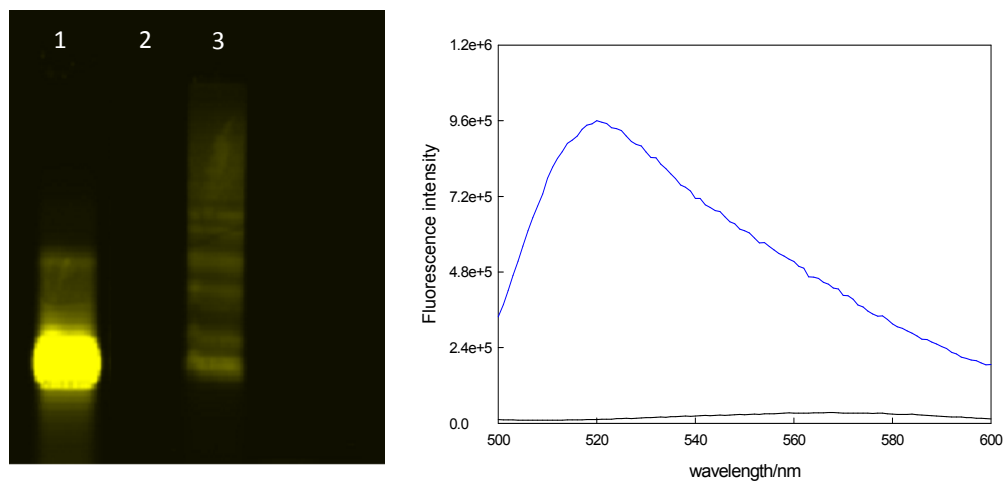
**Figure S6.** Spectroscopic analysis of the interactions between hemin and different samples: initiator conjugated-MNPs (black curve), initiator conjugated-MNPs after HCR (red curve). [Hemin]= 1  $\mu$ M, [ABTS]= 1 mM, [H<sub>2</sub>O<sub>2</sub>]= 2 mM, The concentration of MNPs is 1 nM.



**Figure S7.** (A) Average hydrodynamic sizes of AS1411/MNP-SNAs characterized by DLS as a function of different incubation time in 3% FBS. (B) Fluorescent spectrum of TAMRA-labeled AS1411/MNP-SNAs as a function of different incubation time in 3% FBS (From top to bottom: 0, 0.5, 1.0, 2.0, 5.0 and 10.0 h). The concentration of MNPs is 5 nM.

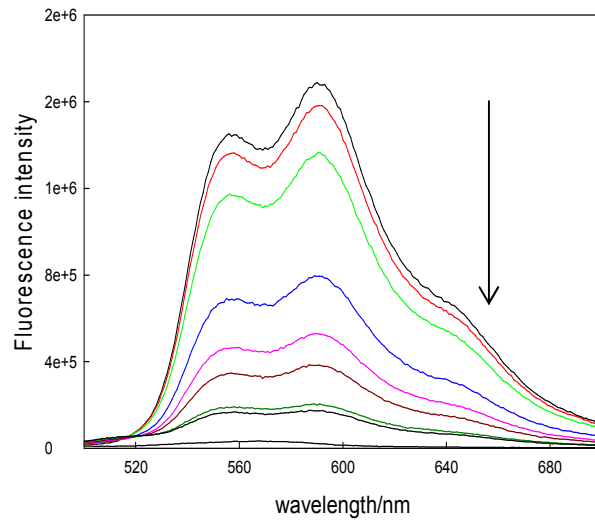


**Figure S8.** Cytotoxicity assay of (black) SKOV3 cells (target cells) and (red) HBE135 cells (control cells) treated with various concentrations of AS1411/MNP-SNAs.

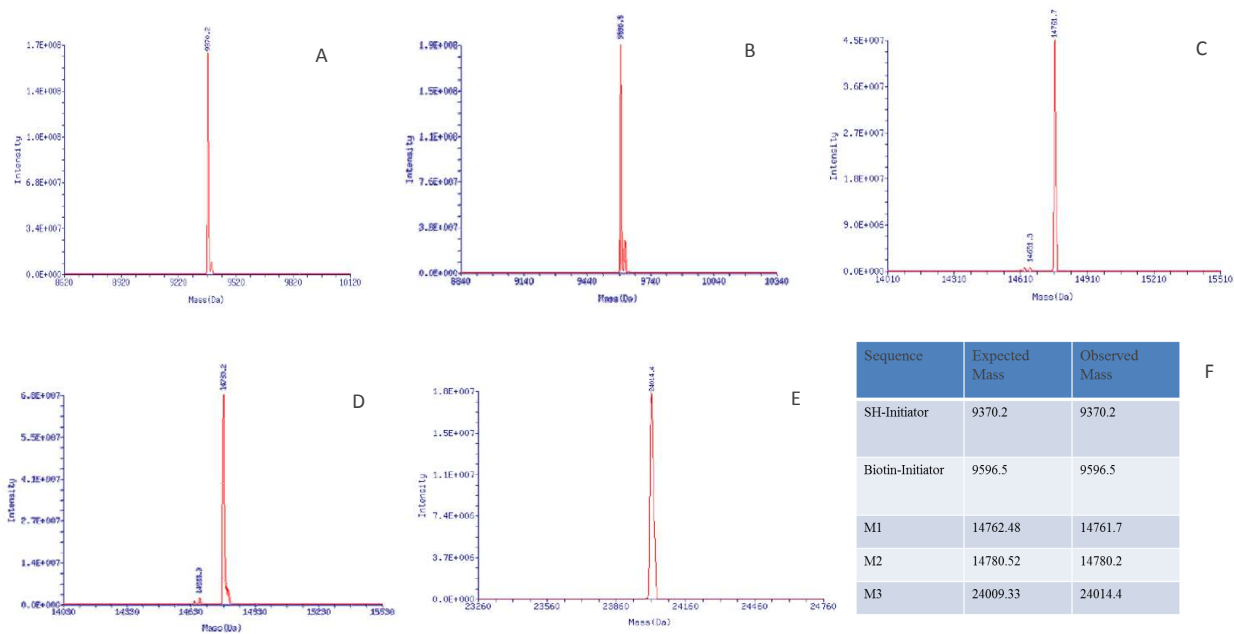


**Figure S9.** (A) 4% agarose gel electrophoresis image of DNA biopolymer before and after FITC-Sgc8 strand I capping. Lane 1: FITC-Sgc8 strand I; Lane 2: DNA biopolymer (Initiator strand: M1: M3=2:10:10); Lane 3: DNA biopolymer capped with FITC-Sgc8 strand I. (B) Fluorescent spectrum of Sgc8/MNP-SNAs before (black) and after (blue) FITC-Sgc8 strand I capping.





**Figure S10.** Fluorescence spectra of DOX solution (2 μM) with increasing equivalences of Sgc8/MNP-SNAs (From top to bottom: 0, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0 and 10 nM).



**Figure S11.** ESI Mass Spectra of SH-Initiator (A), Biotin-Initiator (B), M1(C), M2 (D) and M3 (E). Table F is the mass comparison between expected and observed value for A, B, C, D and E.