Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supporting Information

Thiol-free oligonucleotide surface modification of gold nanoparticles for nanostructure assembly

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S1 – DNA sequences

Name	**Sequence**
A1	ATGACCATGTTATTACGAATTCGAGCTCGGTATTCCCGGGGATCCTCTAGAGTCGTTAGCTGCAGCCAT
A2	CGTATGTTGATCGACTCTAGAGGATCCCCGGGTTGCACTGGCCGTCGTGGTACAATTCGTCGTGACTGG
A2-l	CGTATGTTGATCGACTCTAGAGGATCCCCGGGTTGCACTGGCCGTCGTGGTACAATTCGTCGTGACTGGCTTTCGTCCT
A2-llc	CGTATGTTGATCGACTCTAGAGGATCCCCGGGTTGCACTGGCCGTCGTGGTACAATTCGTCGTGACTGGAGGACGAAAG
A3	TCCTGACGTTTTTGTACCACGACGGCCAGTGCTTACCCAACTTAATCGCCTTGCATTGCACATCCTTCG
A4	CCAGCTGCCTTTGCAAGGCGATTAAGTTGGGTTTTACCGAGCTCGAATTCGTAATTTGTAATAGCGAAG
A4-I	CGAATTCGTAATTTGTAATAGCGAAGCCAGCTGGCTTTGCAAGGCGATTAAGTTGGGTTTTACCGAGCTCTTTCGTCCT
A4-IIc	CGAATTCGTAATTTGTAATAGCGAAGCCAGCTGGCTTTGCAAGGCGATTAAGTTGGGTTTTACCGAGCTAGGACGAAAG
B1	CTTCGCTATTACTTTACGAGTTGTCGAATTGTTTGTTTAAAGTCTAATACTTCTACCTTTGGCAGCTGG
B2	CGAAGGATGTGCTTAGGTAGAAGTATTAGACTTTATTCTTCGCTATTACGCCAGCTGGTTACGACAGGA
B3	CCAGTCACGACGTTCCAGCTGGCGTAATAGCGAAGTTCCTCAAATGTATTATCTATTGTTCAACATACG
B4	ATGCGTGCAGCTTTCAATAGATAATACATTTGAGGTTCAAACAATTCGACAACTCGTATTCATGGTCAT

Table S1. DNA sequences used for octahedron assembly.

Comment: ‘ or * sign shows complementarity (e.g. 11* region is complementary to 11 region), letters a and b correspond to 3’ and 5’ ends of DNA strands (see scheme below). Name xx-I and xx-IIc shows complementary toeholds for equal strands (for example, A2-I belongs to scaffold type 1 and hybridizes with A2-IIc of scaffold D2).

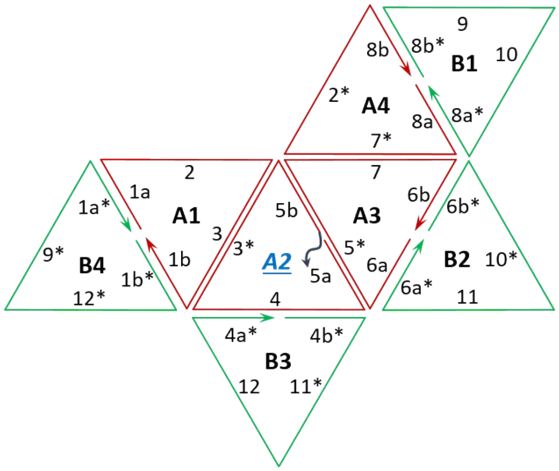
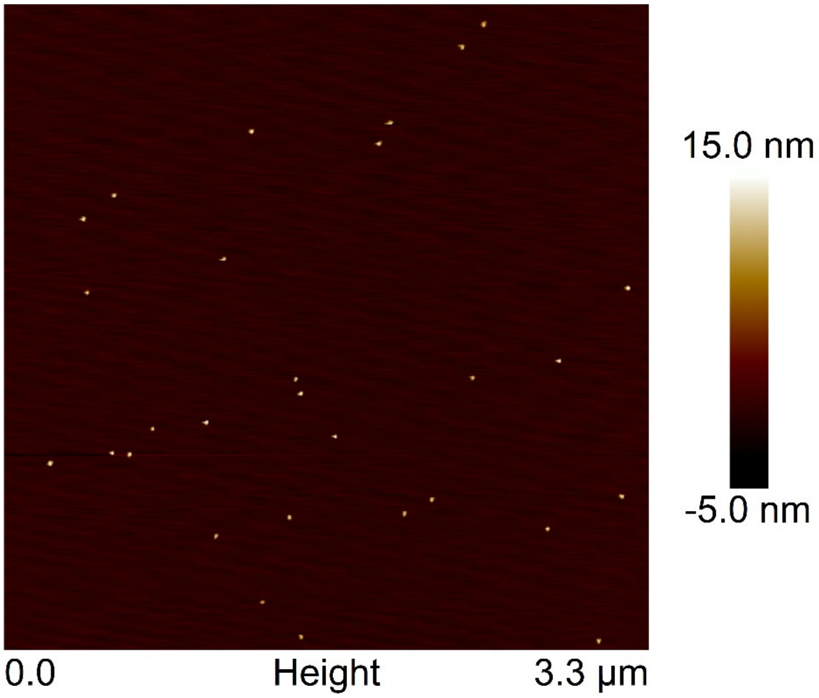


Figure S1. Default octahedron assembly with one ssDNA toehold.

S2 – AFM image of control stock of encapsulated AuNPs in DNA cage.



S3 – AFM image of type 2 AuNPs

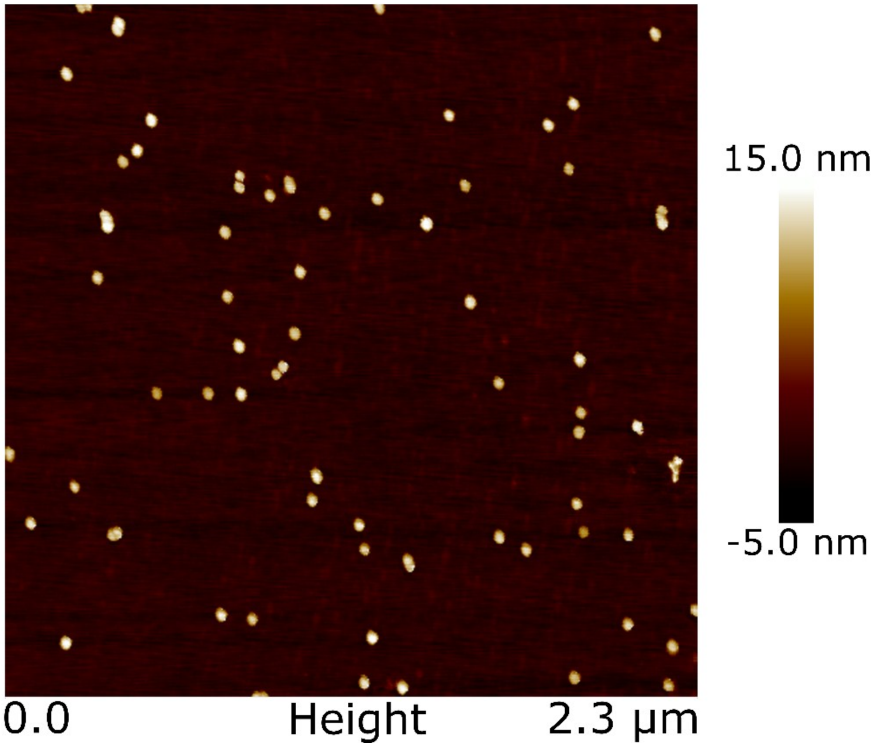


Figure S3. AFM image of type 2 AuNPs

S4 – Principal scheme of T2 type of AuNPs

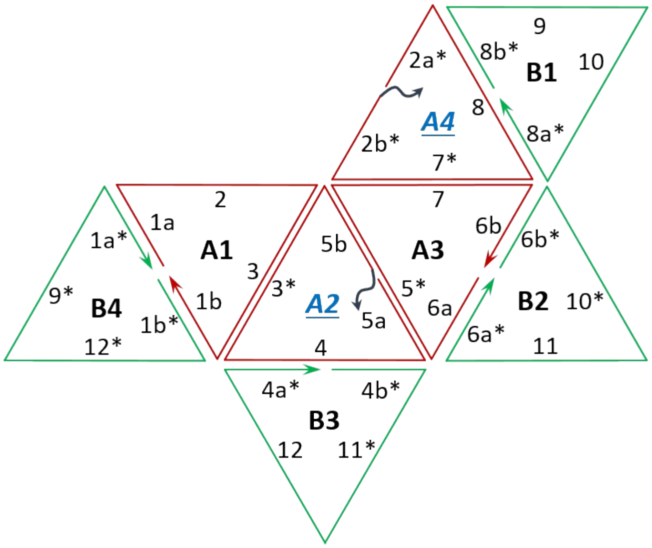


Figure S4. T2 type octahedron.

S5 – AFM image of AuNPs pairs assembly

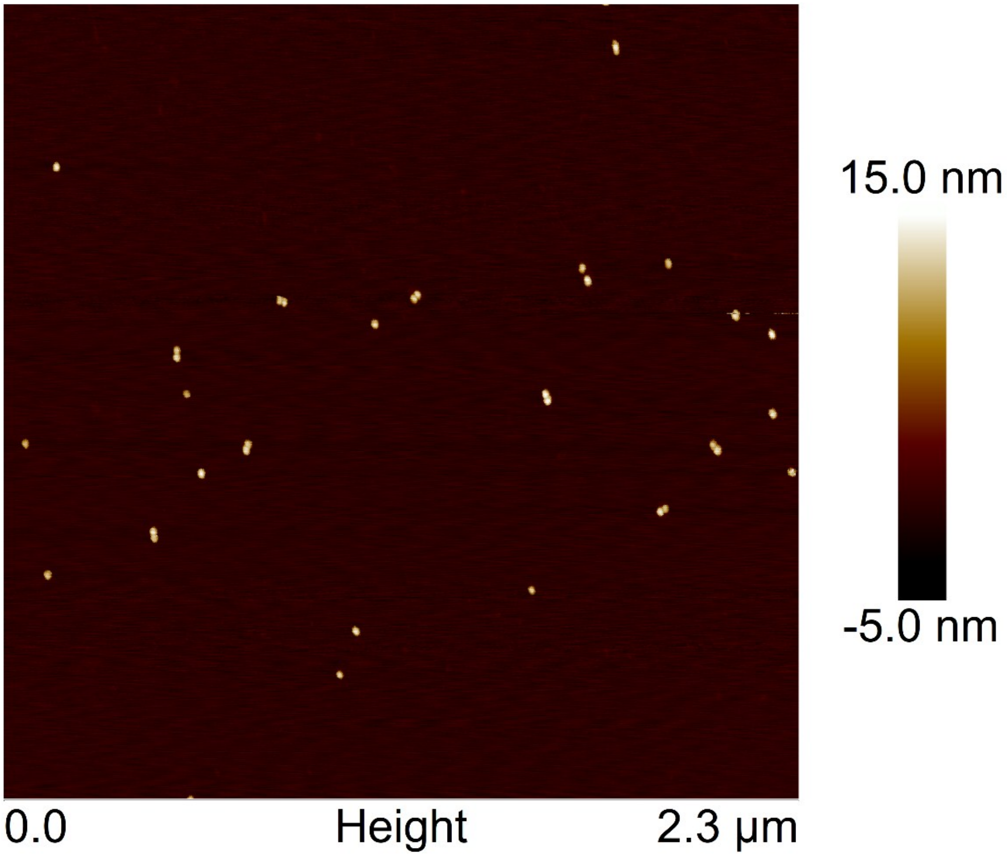


Figure S5. AFM image of AuNPs pairs assembly.

S6 – HCR reaction

Name	Sequence
Target	`GCAGGAGTAGAAGATGGAGCAGC`
Hp 1	`AAAAAAAAAAGCTGCTCCATCTTCTACTCCTGCATCCGGGCAGGAGTAGAAGATGG`
Hp2	`AAAAAAAAAAGCAGGAGTAGAAGATGGAGCAGCCCATCTTCTACTCCTGCCCGGAT`

DNA sequences for hairpins and a target:

Table S6. DNA sequences for HCR reaction: Hp1 and Hp2 stand for hairpin 1 and hairpin 2.

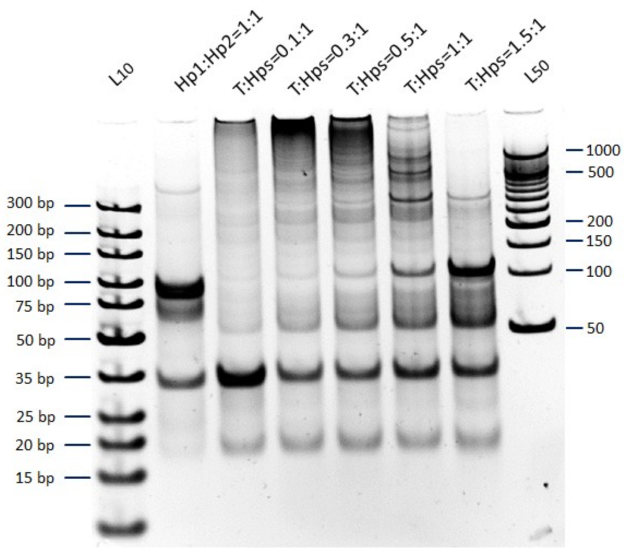


Figure S6. Lane 2: Control mixture of 2 hairpins without a target. Lanes 3-7: reaction mixture of 2 hairpins and the target in different molar ratio.

10% PAGE gel for HCR products (without AuNPs):

S7 – Polymerization

TEM images were taken of six samples with HCR reaction products. Number of chains were calculated (Table S3, Fig. S4):

Length (AuNPs)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Average length	St. error
1	50	38	40	32	56	25	40.16667	4.245368
2	27	12	11	12	9	8	13.16667	2.597185
3	4	3	9	5	4	5	5	0.781736
4	0	3	2	3	2	2	2	0.408248
5	2	1	1	0	2	0	1	0.333333
6	0	0	2	0	1	0	0.5	0.311805
7	1	1	0	2	0	0	0.666667	0.30429

8	0	0	1	0	0	0	0.166667	0.152145

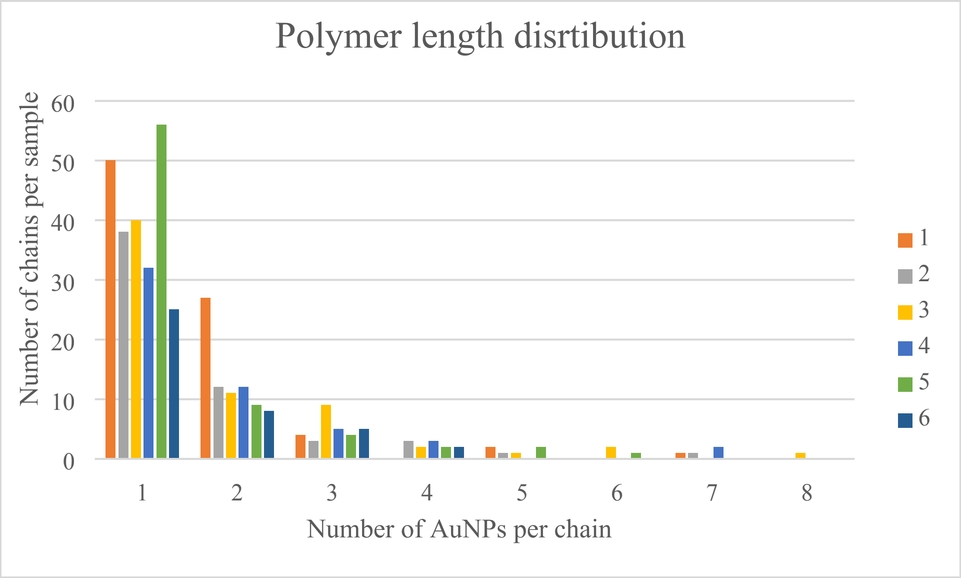


Figure S7. Chains length distribution based on Table S7.

Table S7. Number of chains with designated length in different samples.