Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Multiform DNA Origami Arrays Using Minimal Logic Control

Congzhou Chen,[1] Jin Xu,[1] and Xiaolong Shi*[2]*

[1]Key Laboratory of High Confidence Software Technologies of Ministry of Education, Institute of Software, School of Electronics Engineering and Computer Science, Peking University, Beijing 100871, China

[2]Institute of Computing Science & Technology, Guangzhou University, Guangzhou 510006, China

*Corresponding Authors: jxu@pku.edu.cn, xlshi@gzhu.edu.cn

Supplementary Figure:

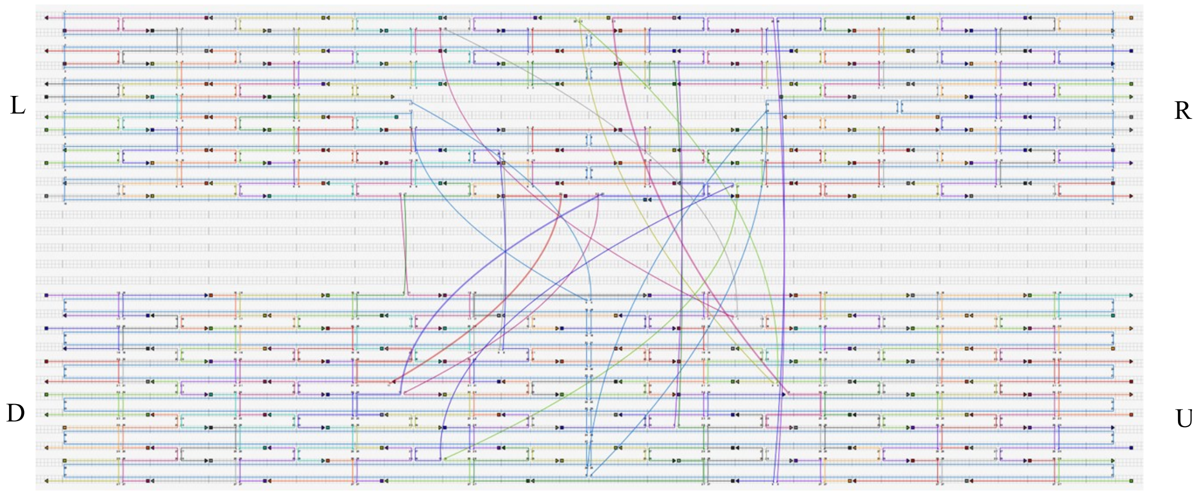


Figure S1. Cross-shaped origami. The directions of this structure label as Left, Right, Down and Up. Represent the four directions.

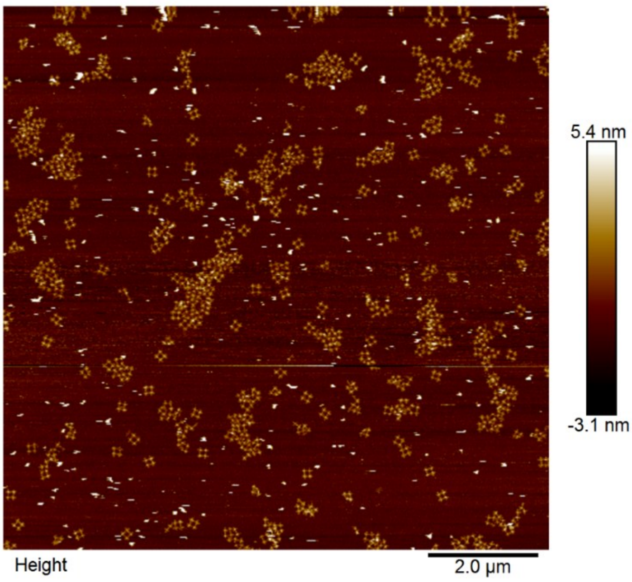
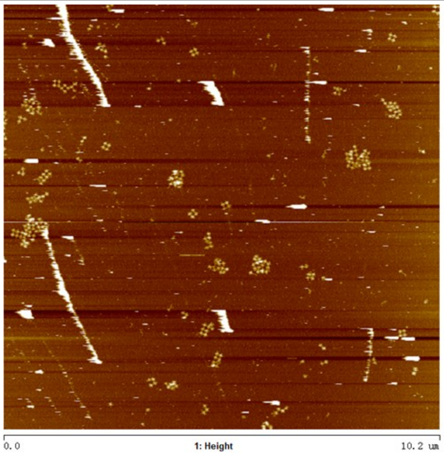
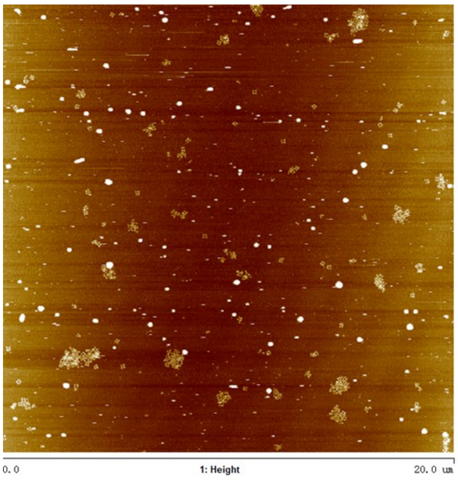
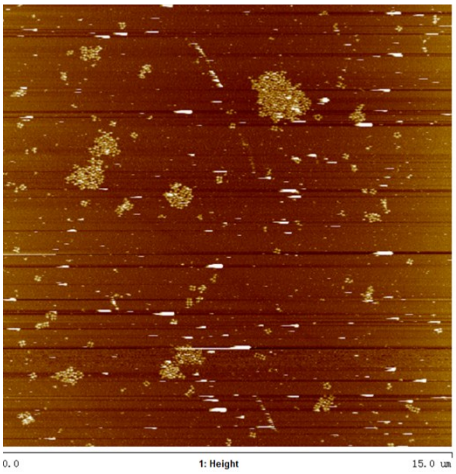


Figure S2. The 2 by 2 arrays, scan size 10um, the final concentration of Origami tile was 2nM.

Anneal temperature

When forming the 4 by 4 arrays, especially in step two, the anneal temperature and time are vital in this process. A suitable temperature helps the construction of the 4 by 4 arrays, higher temperature may disrupt the connection of 2 by 2 arrays, and lower temperature makes the 2 by 2 aggregated. The three trials of temperature are as following.

	Step two, annealing at 55°C,6h
	Step two, annealing at 45°C,6h



Step two, annealing at 35°C,6h

Figure S3. The three check trials. We set the anneal temperature at 45°C.

Anneal time

The anneal time effects the aggregation, the longer the anneal time, the more serious the aggregate will be, a proper anneal time for assemble the 4 by 4 arrays is needed. We set three check trials to explore this situation, that was annealed for 6h, 13h and 20h.

Step two, annealing at 45°C,6h

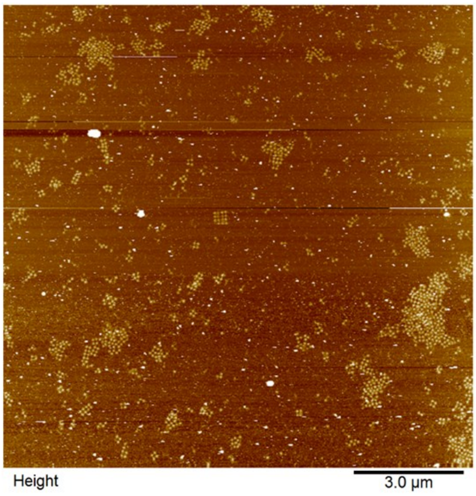
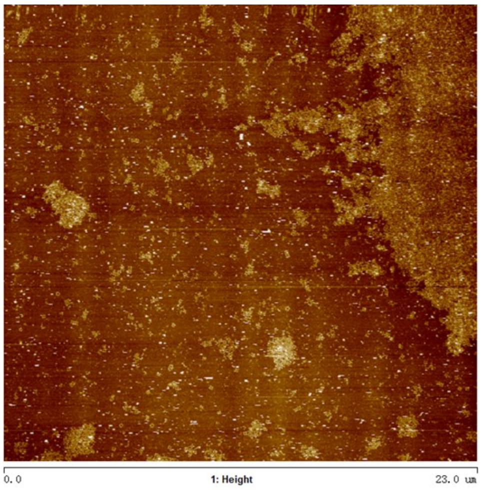
	Step two, annealing at 45°C,13h
	Step two, annealing at 45°C,20h

Figure S4. The check trials. The anneal time around 13h was suitable, that was 0.1°C decline every 8 min from 45°C to 35°C.

The sample should be fresh, we found that even maintain the sample at minus 20℃, it is still in the process of aggregation. In this process, there are two key parameters should be cautious. One is the reaction temperature, which is vital for origami linking with each other, we set at 45°C. The second is final temperature, which can influence the dispersity of the structures. If the final temperature is too high, base stacking may be severe. So we set the final temperature at 45°C and cool to 4°C rapidly, the whole time was 13h.

Unique addressable

We used four linking logics to form the 2 × 2 arrays, which will make the 2 × 2 array unique addressable, as shown in Fig. S5(a).

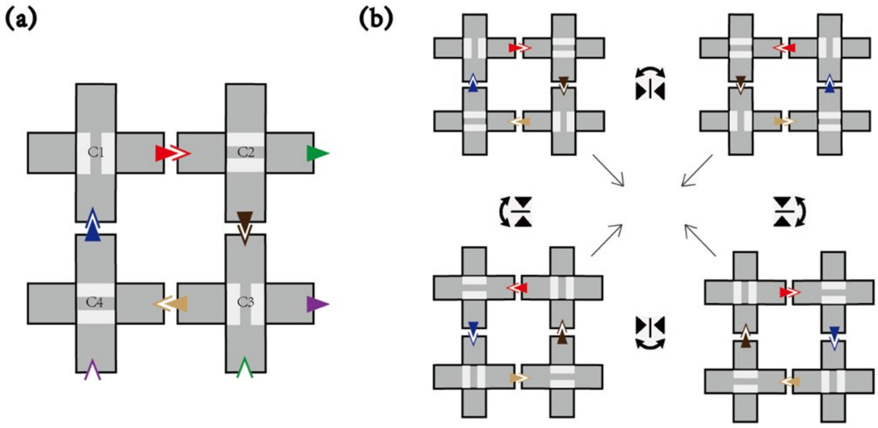


Figure S5. (a) The unique linking strategy for 2 × 2 arrays. (b) The 4 × 4 arrays, rotating and turning in symmtric way.

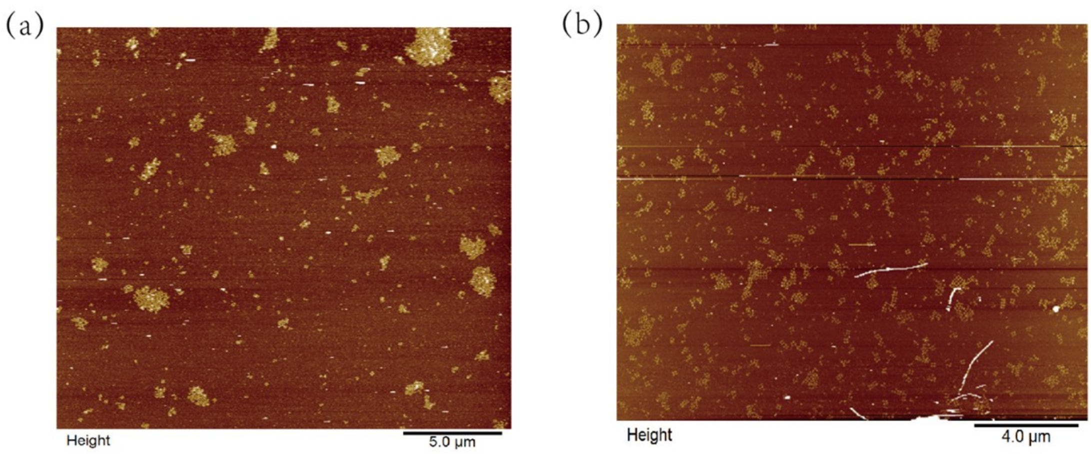


Figure S6. (a) Proposed strategy, 4 × 4 arrays, d-r logic to form the 2 × 2 arrays. (b) Unique addressable, better dispersity, a higher yield of 4 by 4 arrays.

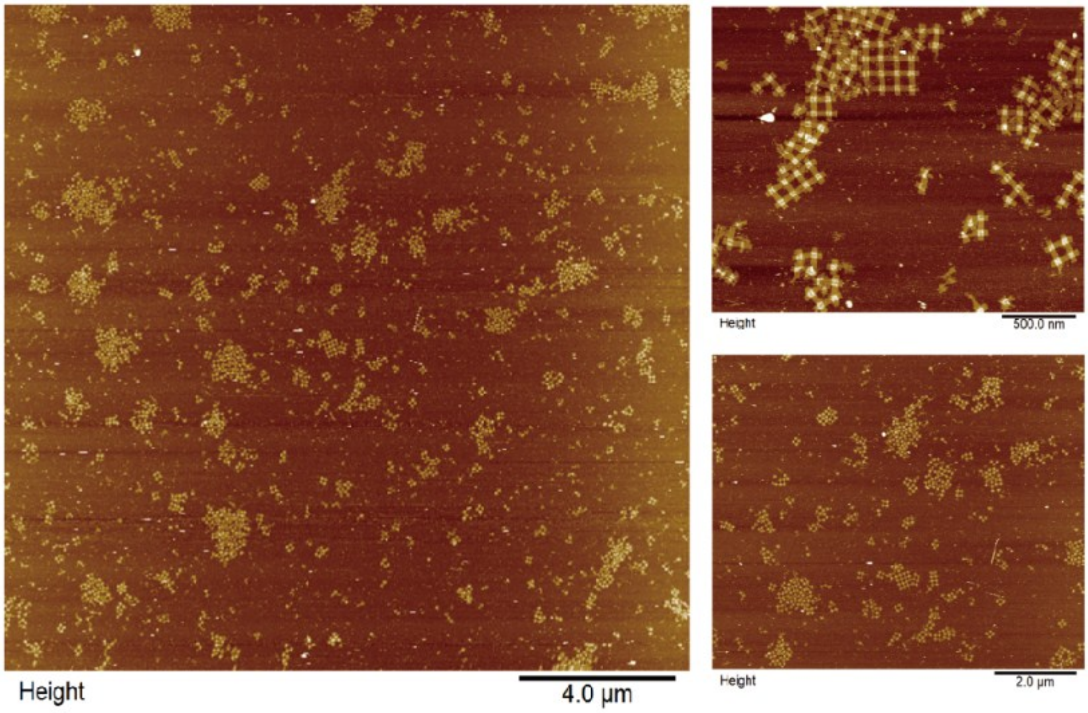


Figure S7. The 4 × 4 arrays, using unique addressable in 2 × 2 arrays.

In this strategy, all the correct 2 × 2 array can form the 4 × 4 arrays, which will improve the yield of 4 by 4 arrays, as shown in Fig. S6(b)&S7. However, the yield was still much lower than that done by Tikhomirov et.al (15%). The conclusion is that the cross-shaped origami has a negative effect on forming plane structures.

Incorrect connections

As we analyzed in the text, the correct linking yield of 4 by 4 array is $1/4^4$. Therefore, there were a lot of incorrect connections, which formed plenty of logic chaotic arrays.

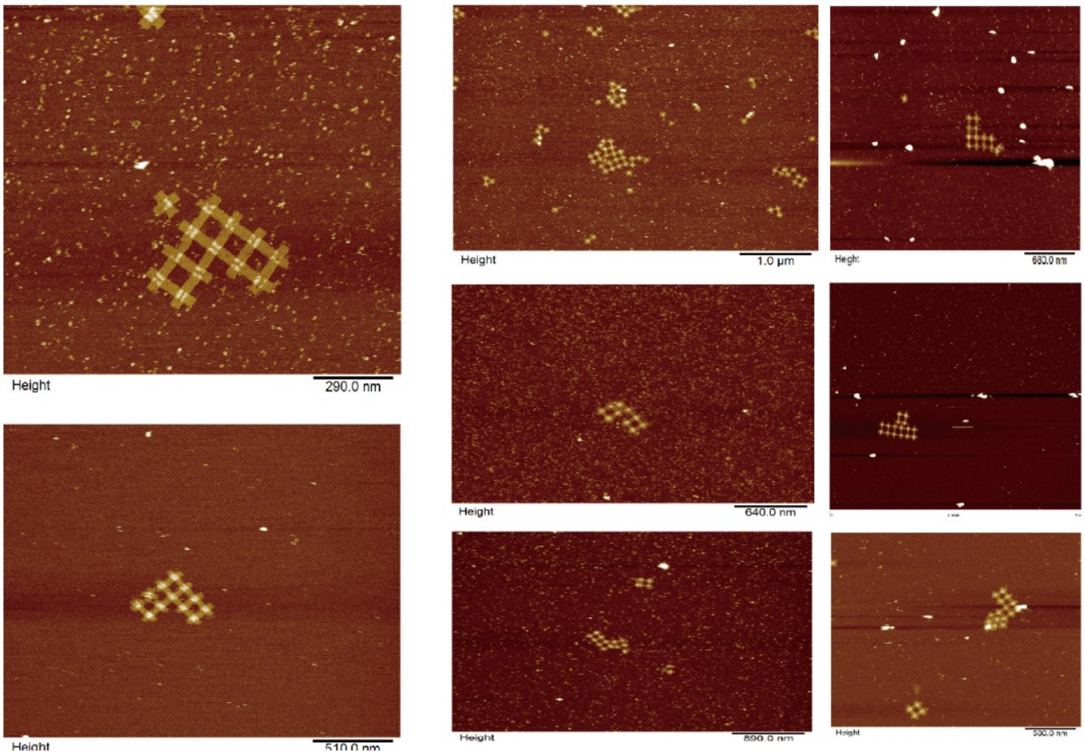


Figure S8. Logic chaotic arrays. Some arrays lacked a 2 × 2 tile, and some arrays were logic randomness. They are the result of incorrect connections, and most of the logic chaotic arrays had been aggregated together.

Supplementary table

DNA sequences

Cross shape origami

1[40]3[39]	ATTCCAAGTGAATCTTACCAACGCGTTACAAA
23[88]25[87]	TCATTTTTAGCAAAGCGGATTGCAAAAATGTT
25[56]27[55]	AGTTTTGCTACGAGGCATAGTAAGAGATGGTT
22[199]20[200]	GAGGCTGAATTCACAAACAAATAAAGAGCCGC
11[40]10[56]	GTTCCGAAATCGGCAAAATCCCTTTGGCCCTG
17[88]19[87]	ACAACCCGTATTTAAATTGTAAACTACAAAGG
22[39]20[40]	TATTTTCATCTACTAATAGTAGTAAGAAAGGC
6[255]7[231]	TGCACGTAAAAACGGTCAATCATAAGGGAACCCCAGAAGG
8[279]6[280]	ATCTAAAAAATTCATCAATATAATGAAGGGTT
5[264]7[263]	TAGATTTTCCATATCAAAATTATTATTATCAG

1[264]3[263]	CACCGGAAATTTATCAAAATCATAGCTATTAA
21[120]22[106]	AAAGCTAAATAACAGTTGATTCCCAATTCT
4[215]2[216]	TTTCAATTACATAAATCAATATATTAGGTTGG
19[120]21[119]	ACAAGAGACAAGGATAAAAATTTTCAGAGCAT
25[248]27[247]	AAAGGAATATTTCTTAAACAGCTTGCTTTGAG
23[56]25[55]	GAGTACCTGAAGCCCGAAAGACTTGCAAAAGA
25[216]27[215]	TTTCAGCGCCGACAATGACAACAAGCATCGGA
10[183]8[184]	GAACGAACTCAGTATTAACACCGCACAAACAA
1[168]2[152]	TTTTCAAACAAGACAAAGAACGCGATCCGGTA
25[152]24[168]	TTTAAACACCAGACGTTAGTAAATAAGTTTTG
3[264]5[263]	TTAATTTTTTCGCCTGATTGCTTTAAATTGCG
22[263]20[264]	GTATAAACCCAGTAAGCGTCATACCACCGGAA
19[248]21[247]	AGCGCGTTCTCAGAGCCGCCACCCCTCTGAAT
8[247]7[255]	ATAGATTATATCATCATATTCCTG
6[87]4[88]	CCAGTTTGCGGAATACCCAAAAGAACCCACAA
3[40]5[39]	ATAAACAGAATAGCAATAGCTATCATAGCCGA
24[135]22[136]	AATCAAAAATGCTGTAGCTCAACAGGAAGTTT
25[280]27[279]	GAAAATCTTGTATCGGTTTATCAGGTTTCCAT
7[264]9[263]	ATGATGGCTATCTTTAGGAGCACTCTCAAATA
11[264]10[280]	CAGTCACACGACCAGTAATAAAAGTGACCTGA
17[120]19[119]	GCGGATTGAGCCCCAAAAACAGGATGGAGCAA
28[143]26[136]	CGGTGTACAGACCAGGTTGGGAAGAAAAATCTATTACAGG
0[145]1[135]	TTCTGTCCAGACGACGACCCAATAGC
11[200]10[216]	ATGGAAATACCTACATTTTGACGCCGCGAACT
28[231]26[232]	ATTATACCAGCAACGGCTACAGAGGATACCGA
1[72]3[71]	ACTCATCGTTGCTATTTTGCACCCAATCCAAA
10[119]8[120]	GGGTGGTTCCGCTTTCCAGTCGGGCCAGTGCC
2[247]0[248]	AGACTACCAATAAGGCGTTAAATAAGGGCTTA
18[39]17[55]	TCAGCTCAATTCGCGTCTGGCCTTCCTGTAGC
5[40]7[39]	ACAAAGTTTCGCACTCCAGCCAGCGCAAAGCG
0[279]1[263]	AGTATAAAGCCAACGCTCAACAGTAGAATAAA
26[199]24[200]	CACGCATAATTTGCTAAACAACTCAGACAGC
17[248]19[247]	AAGTTTATGAAATTATTCATTAAACAGACTGT
19[152]18[168]	TAGCATGTAAGGCCGGAAACGTCACACCATTA
10[247]8[248]	TTGAATGGCATCACCTTGCTGAACAACAACTA
9[264]11[263]	TCAAACCCGAATACGTGGCACAGAAGATTCAC
0[247]1[231]	ATTGAGAATCGCCATATTTAACAATACCGACC
7[40]9[39]	CCATTCGCGCTGTTTCCTGTGTGAACGAGCCG
17[280]19[279]	ATATGGTTACCGATTGAGGGAGGGGTCATAGC
9[232]11[231]	ATCTAAAGCTATTAGTCTTTAATGTCAATCGT
0[55]1[39]	TAATATCCCATCCTAATTTACGAGTCCTTATC
26[231]24[232]	TAGTTGCGGAGTGAGAATAGAAAGCCAGTACA
27[184]28[144]	CGTCACCCTCATCGCCTGATAAATTGTGTCGAAATCCGCGAAAGAGGACAGATGAA

27[248]28[232]	GACTAAAGAACACTCATCTTTGACCCCCAGCG
21[280]23[279]	TGATGATATCAGTGCCTTGAGTAACCACCCTC
21[152]20[168]	ACCCTGTAAGGTTGAGGCAGGTCACGCCAGCA
18[167]19[151]	CCATTAGCCAATCATATGTACCCCCGTAAAAC
23[152]22[168]	ATATGCAAGTTTGCTCAGTACCAGATTAGGA
21[88]23[87]	TAGCAAAAAGATTTAGTTTGACCAATAAGAGG
28[199]26[200]	GATTTGTATCAGCAGCGAAAGACACCATCGCC
27[56]28[40]	TAATTTCATCAACGTAACAAAGCTGCTCATTC
27[152]26[168]	AAAACGAAAGTTAAAGGCCGCTTTGCTGAGGC
19[280]21[279]	CCCCTTATCCGGAACCAGAGCCACATGGCTTT
25[88]27[87]	TAGACTGGAACTAATGCAGATACAATTACCTT
11[72]10[88]	AAAGAATAGCCCGAGATAGGGTTGAGACGGGC
23[280]25[279]	AGAACCGCATAGCAAGCCCAATAGTTCACGTT
19[56]21[55]	GAGGGTAGAAGATTCAAAAGGGTGGCATTAAC
22[167]23[151]	TTAGCGGGCTAAAGTACGGTGTCTTGTTTTAA
18[231]17[247]	ATCACCGTAGAAACGCAAAGACACCACGGAAT
4[119]2[120]	TTGAGCGCCAGCCTTTACAGAGAGCGAACCTC
20[263]18[264]	CCGCCTCCTTCATCGGCATTTTCGAAGGTAAA
18[71]17[87]	TTTGTTAAATCAACATTAAATGTGAGCGAGTA
9[40]11[39]	GAAGCATAGCAGCAAGCGGTCCACTGATGGTG
7[200]9[199]	TCATTTTGAGAAGTATTAGACTTTCTGCAACA
20[167]21[151]	TTGACAGGATACTTTTGCGGGAGAACATTATG
19[184]21[183]	ACCATCGACCACCACCAGAGCCGCGACGATTG
10[279]8[280]	AAGCGTAATCAATCAATATCTGGTGGAAGGTT
17[216]19[215]	CATATAAACACCGACTTGAGCCATAGTAGCGA
24[263]22[264]	GTACCGTAGCCACCCTCAGAACCGCAGTGCCC
10[151]9[167]	GCGGGGAGCTGCATTAATGAATCGAACAGAGG
9[168]10[152]	TGAGGCGGCACCAGCAGAAGATAAGCCAACGC
3[72]5[71]	TAAGAAACTTAAGCCCAATAATAAGGAAACGC
28[263]26[264]	TACACTAAACTTTTTCATGAGGAACTTGCTTT
21[184]23[183]	GCCTTGATGACTCCTCAAGAGAAGGGCGGATA
21[248]23[247]	TTACCGTTAGTTAATGCCCCCTGCCAGGAGGT
24[231]22[232]	AACTACAAGGTGTATCACCGTACTCTATTTCG
7[72]9[71]	AAGGGCGAGTACCGAGCTCGAATTGTGCCTAA
26[39]24[40]	TATCATAAATAGCGAGAGGCTTTTCAAATATC
0[87]1[71]	ATCAACAATAGATAAGTCCTGAACAGTACCGC
26[263]24[264]	CGAGGTGATGCGAATAATAATTTTGAACCCAT
27[280]28[264]	TAAACGGGCCTAAAACGAAAGAGGCAAAAGAA
20[39]18[40]	CGGAGACATCTAGCTGATAAATTATTGTTAAA
4[247]2[248]	AGTTACAAGCTTCTGTAAATCGTCGGTCTGAG
23[248]25[247]	TTAGTACCACACTGAGTTTCGTCAGAACAACT
20[71]18[72]	TGTAGGTACTATTTTTGAGAGATCGTTAATAT
11[232]10[248]	CTGAAATGGATTATTTACATTGGCCAATATTT
18[135]17[175]	ATCAGAAAACCGTAATGGGATAGGTCACGTTGGTGTAGATCTCCTTA

	TTACGCAGT
19[216]21[215]	CAGAATCACAGAGCCACCACCCTCATCCTCAT
26[135]24[136]	TAGAAAGAATTCATTGAATCCCCCTGACCATA
20[231]18[232]	GCCACCCTAGTTTGCCTTTAGCGTGGTGAATT
8[215]6[213]	GAGGATTTCGGAACAAAGAAACCAGAACTGACCAA
1[104]3[103]	TCATCGTACGGGAGGTTTTGAAGCTCAAAAAT
18[263]17[279]	TATTGACGTTTGTCACAATCAATAGAAAATTC
6[279]4[280]	AGAACCTACAGGTTTAACGTCAGAGAGAAACA
2[183]0[184]	TCCAATCGTATATTTTAGTTAATTGAGCCAGT
28[71]26[72]	TACCCAAAACTTTAATCATTGTGATAACGCCA
21[56]23[55]	ATCCAATAAATGGTCAATAACCTGGGATTAGA
1[232]3[231]	GTGTGATATTTTTAACCTCCGGCTGTGAGTGA
2[55]0[56]	TTTTATCCAACGGGTATTAAACCAAAGAAAAA
9[136]11[135]	CGTGCCAGAGGCGGTTTGCGTATTATTAAAGA
26[103]24[104]	CCACATTCATAGCGTCCAATACTGGACTATTA
22[71]20[72]	ATTTCGCAAATCATACAGGCAAGGGAGTAATG
24[167]25[151]	TCGTCTTTGTTCAGAAAACGAGAATCAAATGC
4[279]2[280]	ATAACGGACCCTTAGAATCCTTGAGAAGAGTC
10[215]8[216]	GATAGCCCCTGAGAGCCAGCAGCAATACATTT
5[72]7[71]	AATAATAAAGGGGACGACGACAGTCTGTTGGG
2[151]1[167]	TTCTAAGACAGATATAGAAGGCTTAGAAAACT
1[136]3[135]	AAGCAAATACGCGAGGCGTTTTAGAATAACAT
28[39]26[40]	AGTGAATATAGTAAATTGGGCTTGAGCAACAC
1[200]3[199]	TGACCTAAACTATATGTAAATGCTTTTTAATG
7[104]9[103]	CGCCAGCTATGCCTGCAGGTCGACGCGTTGCG
17[56]19[55]	CAGCTTTCAATTCGCATTAAATTTATGCCGGA
2[87]0[88]	AAGATTAGAGAACAAGCAAGCCGTGCCTGTTT
6[55]4[56]	CAGGAAGAACCAGAAGGAAACCGAGAGCAAGA
2[279]0[280]	AATAGTGATCATAATTACTAGAAATTCTTACC
5[212]4[216]	TGCTCCATGTTAATTATTCA
8[55]6[56]	TGGTCATACATTCAGGCTGCGCAAATCGGCCT
20[103]18[104]	TCATATATTCATTGCCTGAGAGTCAGATTGTA
4[55]2[56]	AACAATGACCATATTATTTATCCCAGCTACAA
4[87]2[88]	GAATTGAGGATTTTTTGTTTAACGCTTAAATC
27[88]28[72]	ATGCGATTTCTTGACAAGAACCGGATATTCAT
24[199]23[213]	CCTCATAGCGAGAGGGTTGATATAAGTATA
19[88]21[87]	CTATCAGGTTTAAATGCAATGCCTCAAAGAAT
5[232]4[248]	GAACGAGGCGCAGCAGAAATAAAGGAATACCA
17[176]19[183]	ATGTTAGCAAACGTAGGCAAAATCACCAGTAGCCAATGAA
24[71]22[72]	ATTAAGAGTTAATTGCTCCTTTTGTTAGATAC
26[71]24[72]	AAAGGAATCAGAGGGGGTAATAGTTCAAAAAG
23[120]25[119]	TGAATATAATCAGGTCTTTACCCTCGGAATCG
0[119]1[103]	ACATGTTCAGCTAATGCAGAACGCTTTTATTT
28[103]26[104]	AAGAGTAATTAAGAACTGGCTCATTAGGAATA

10[55]8[56]	AGAGAGTTAAGTGTAAAGCCTGGGCGTAATCA
10[87]8[88]	AACAGCTGCTAACTCACATTAATTTCTAGAGG
26[167]27[151]	TTGCAGGGCTAACGGAACAACATTACGTTAAT
8[87]6[88]	ATCCCCGGTCGGTGCGGGCCTCTTTGCATCTG
22[231]20[232]	GAACCTATGAATGGAAAGCGCAGTTCAGAACC
7[232]9[231]	AGCGGAATGAGCCGTCAATAGATAAATGAAAA
24[39]22[40]	GCGTTTTAAAACTCCAACAGGTCATTTAGCTA
9[72]11[71]	TGAGTGAGATTGCCCTTCACCGCCATAAATCA
3[104]5[106]	GAAAATAGTAATATCAGAGAGATAACTGGCATGAT
6[107]7[103]	GCATCGTAACCGCGCTATTA
3[232]5[231]	ATAACCTTAATCGCGCAGAGGCGACTTAGCCG
9[104]17[119]	CTCACTGCTTTCTTTTCACCAGTGAGTGTTGTTCCAGTGGAACAAACG
18[103]10[120]	TAAGCAAATCGGATTCTCCGTGTTTTGGAACAAGAGTCCACTGGGCGCCA
7[136]18[136]	GCGATTAACGTTGTAATTTTCAACGATCGATGAACGGTAATGGTTGATA
22[135]9[135]	CATTCCATATCGGTTGTACCAAAAAGCCTTTATAACGACGGAAACCTGT
11[136]20[104]	ACGTGGACTCCAACGTCTTGCGAACGAGTTTAAGCAATAAAGCCTTAGAACCC
24[103]10[184]	TAGTCAGAGCGGATGGCTTAGTAAACCGTCTATCAGCCATTGCAACAGGAAAAAATACC
11[153]23[119]	AAAGGGCGAATAGCTTAATTGC
25[120]11[199]	TCATAAATTTCATCAGTTGAGATTTATACCAGTCGCCATTAAAACGCTC
9[200]28[104]	GTGCCACGTAAAACATTTCAGGACGCGCATAGGCTGGCTGACCTTCATC
4[183]27[183]	ACAAACATTCATTTGATTGTATGGGACCGATATATTCGGTCTGCGGGAT
23[184]2[184]	AGTGCCGTTTAGCGTAACGATCTAGAATTTTCTATTACCTTGATGCAAA
2[215]28[200]	GTTATATAATTTAATGGTTTGAAACGCCAACATGTAATAGTACAACGGA
27[216]1[199]	ACGAGGGTAAGCGCGAAACAATTTTAGGCAGAGGCATTTTCTCATCTTC
0[183]25[215]	AATAAGAGAATATAAAGTTTGCCCGGAATACGCCTGTAGCATTCCATTCAACAG
0[165]22[200]	ACCGACAAATGAAAGTATTAA
21[216]0[146]	TAAAGCCATATTCTGAAACATTAGGTAAAGTAA
2[119]17[215]	CCGACTTGGGAATCATTTAGAGCCAAAAATACATACATAAAGGTGGCAA
20[199]0[120]	CACCAGAATAGCAGCACCGTAATCTTGGGAATTTACCGCGCAATAAACA
3[136]4[120]	AAAAACAGACCCTGAACAAAGTCAGAGGGTAA

8[119]7[135]	AAGCTTGCGGCGAAAGGGGGATGTGCTGCAAG
8[151]7[167]	AGTCACGAGTTGGGTAACGCCAGGTGCCCGAA
7[168]8[152]	CGTTATTACTCGTATTAAATCCTTGTTTTCCC
3[168]4[152]	TAACAATTCAAGAAAACAAAATTAGGAGAATT
4[151]3[167]	AACTGAACGGAAGCGCATTAGACGATTACATT
3[200]4[184]	GAAACAGTACCTGAGCAAAAGAAGATGATGAA
8[183]7[199]	TTCGACAAATTTTAAAAGTTTGAGTAACATTA

Outside edges

Left hairpin

1[16]0[11]	GTGTCGTAGACACAATAATCGGCTGTCTTCATGTAGAAACCAATCGTGTCGTAGACAC
5[11]4[11]	GTGTCGTAGACACTAAGAAAAGTAAGCAGTTACCGAAGCCCTTTTGTGTCGTAGACAC
7[11]6[11]	GTGTCGTAGACACTGGTGCCGGAAACCAGTTTCCGGCACCGCTTCGTGTCGTAGACAC
11[11]10[16]	GTGTCGTAGACACAGGCGAAAATCCTGTTGCTGGTTTGCCCCAGCGTGTCGTAGACAC

Up hairpin

0[308]1[303]	GTGTCGTAGACACATATGCGTTATACAAAAAGCCTGTTTAGTATCGTGTCGTAGACAC
4[308]5[308]	GTGTCGTAGACACGTACCTTTTACATCGGTGAATATACAGTAACAGTGTCGTAGACAC
6[308]7[308]	GTGTCGTAGACACATACTTCTGAATAATGCCTGATTGTTTGGATTGTGTCGTAGACAC
10[303]11[308]	GTGTCGTAGACACAGAGATAGAACCCTTCGGACATTCTGGCCAACGTGTCGTAGACAC

Connection strands

Down-Right

Down

0[308]1[303]	TCACTATATGCGTTATACAAAAAGCCTGTTTAGTATC
2[308]3[303]	CTATCTAGATTAAGACGCTGAAAACATAGCGATAGCT
4[308]5[308]	ACGCAGTACCTTTTACATCGGTGAATATACAGTAACAACGCA
6[308]7[308]	CAGACATACTTCTGAATAATGCCTGATTGTTTGGATTCAGAC
8[303]9[308]	AGTTGAAAGGAATTGACAGTTGGCAAATCAACGTCTG

10[303]11[308]	AGAGATAGAACCCTTCGGACATTCTGGCCAACTGCGT
Right	
17[11]18[16]	AGTGAAACGCCATCAAAAATATTTTTAACCAATAGG
19[11]20[16]	GATAGTATGATATTCAACCGTGTCAAATCACCATCAA
21[11]22[11]	TGCGTAAAAGGTGGCATCAATTTTGGGGCGCGAGCTGTGCGT
23[11]24[11]	GTCTGGAACCAGACCGGAAGCATTCGAGCTTCAAAGCGTCTG
25[16]26[11]	GACGATAAAAACCAAACCCTCGTTTACCAGACCAGAC
27[16]28[11]	GAAACACCAGAACGAGAGGCTTGCCCTGACGAACGCA

Up-left

Up	
18[303]17[308]	AAAAGGGCGACATTCATACCAGCGCCAAAGACCATAC
20[303]19[308]	TTCATAATCAAAATCATAGCGTTTGCCATCTTCGTGC
22[308]21[308]	GCACGATAAGTTTTAACGGGGCAGGAGTGTACTGGTAGCACG
24[308]23[308]	ATCTAACCCTCATTTTCAGGGCACCCTCAGAGCCACCATCTA
26[308]25[303]	CGAGCAAAAGGAGCCTTTAATCCAAAAAAAAGGCTCC
28[308]27[303]	TACATACTACGAAGGCACCAATAAAATACGTAATGCC
Left	
1[16]0[11]	AATAATCGGCTGTCTTCATGTAGAAACCAATCGTATG
3[16]2[11]	AGAGCCTAATTTGCCATAACGAGCGTCTTTCCGCACG
5[11]4[11]	CGTGCTAAGAAAAGTAAGCAGTTACCGAAGCCCTTTTCGTGC
7[11]6[11]	TAGATTGGTGCCGGAAACCAGTTTCCGGCACCGCTTCTAGAT
9[11]8[16]	GCTCGCAATTCCACACAACATAATTGTTATCCGCTCA
11[11]10[16]	ATGTAAGGCGAAAATCCTGTTGCTGGTTTGCCCCAGC

Up-Up

18[303]17[308]	AAAAGGGCGACATTCATACCAGCGCCAAAGACCATAC
20[303]19[308]	TTCATAATCAAAATCATAGCGTTTGCCATCTTCGTGC
22[308]21[308]	GCACGATAAGTTTTAACGGGGCAGGAGTGTACTGGTAGCACG
24[308]23[308]	ATCTAACCCTCATTTTCAGGGCACCCTCAGAGCCACCATCTA
26[308]25[303]	CGAGCAAAAGGAGCCTTTAATCCAAAAAAAAGGCTCC
28[308]27[303]	TACATACTACGAAGGCACCAATAAAATACGTAATGCC
18[303]17[308]	AAAAGGGCGACATTCATACCAGCGCCAAAGACGTATG
20[303]19[308]	TTCATAATCAAAATCATAGCGTTTGCCATCTTGCACG
22[308]21[308]	CGTGCATAAGTTTTAACGGGGCAGGAGTGTACTGGTACGTGC
24[308]23[308]	TAGATACCCTCATTTTCAGGGCACCCTCAGAGCCACCTAGAT
26[308]25[303]	GCTCGAAAAGGAGCCTTTAATCCAAAAAAAAGGCTCC
28[308]27[303]	ATGTAACTACGAAGGCACCAATAAAATACGTAATGCC

Left-Left

1[16]0[11]	AATAATCGGCTGTCTTCATGTAGAAACCAATCCTATA
3[16]2[11]	AGAGCCTAATTTGCCATAACGAGCGTCTTTCCGTCTC
5[11]4[11]	CTCTTTAAGAAAAGTAAGCAGTTACCGAAGCCCTTTTTAAGTC

7[11]6[11]	TTTCGTGGTGCCGGAAACCAGTTTCCGGCACCGCTTCCGTGC
9[11]8[16]	AGATTCAATTCCACACAACATAATTGTTATCCGCTCA
11[11]10[16]	CGAGTAGGCGAAAATCCTGTTGCTGGTTTGCCCCAGC

1[16]0[11]	AATAATCGGCTGTCTTCATGTAGAAACCAATCTATAG
3[16]2[11]	AGAGCCTAATTTGCCATAACGAGCGTCTTTCCGAGAC
5[11]4[11]	AAGAGTAAGAAAAGTAAGCAGTTACCGAAGCCCTTTTTGACTT
7[11]6[11]	CGAAATGGTGCCGGAAACCAGTTTCCGGCACCGCTTCGCACG
9[11]8[16]	AATCTCAATTCCACACAACATAATTGTTATCCGCTCA
11[11]10[16]	ACTCGAGGCGAAAATCCTGTTGCTGGTTTGCCCCAGC