SI APPENDIX

--Variable-Width System – Tile Strand Sequences --

Nucleation Barrier Block:

```
Z1-1  (26-mer):  5' – CTTGTCAAACGCACCACTCTGAGGAA                         – 3'
Z1-2  (48-mer):  5' – CAGAGTGGACGAAAGCTCACGGCACCAAGTATCAGGTTCCTGCGTTTG   – 3'
Z1-3  (48-mer):  5' – CTGTAGCCTGCCGTGAGCTTCGTGGAACCTGATACTTGGACGAGTTG    – 3'
Z1-4  (26-mer):  5' – ATGCTCAACTCGTGGCTACAGAAGAG                         – 3'
Z2-1  (26-mer):  5' – AAGTCGAACGACCACATCATCCGATT                         – 3'
Z2-2  (48-mer):  5' – GATGATGTCCTTGTAAACTTCGCCACTCTAATCGCAATCAGGTCGTTC   – 3'
Z2-3  (48-mer):  5' – GAGCAACAGGCGAAGTTACAAGGTGATTGCGATTAGAGTCCGTAAGC    – 3'
Z2-4  (26-mer):  5' – ATCACGCTTACGGTGTTGCTCGCTAA                         – 3'
Z3-1  (26-mer):  5' – TGGAACAGCCAGTGGTAGGAGCTCTT                         – 3'
Z3-2  (48-mer):  5' – CTCCTACCTGCGAATCTCTGTAGTGGTGTCGTCTCGGACTGGCTG      – 3'
Z3-3  (48-mer):  5' – CAATGCGGACTACAGAGATTCGCACCGAGCAGCAGACACCTGAGACGG   – 3'
Z3-4  (26-mer):  5' – ACAAGCCGTCTCACCGCATTGAATCG                         – 3'
Z4-1  (26-mer):  5' – AGCCATGGCAATCCACAACCGCTTAGC                        – 3'
Z4-2  (48-mer):  5' – GCGGTTGTCCAACTTACCAGATCCACAAGCCGACGTTACAGGATTGCC   – 3'
Z4-3  (48-mer):  5' – GCTCTACAGGATCTGGTAAGTTGGTGTAACGTCGGCTTGTCCGTTCGC   – 3'
Z4-4  (26-mer):  5' – GACTTGCGAACGGTGTAGAGCGACAT                         – 3'
```

Variable-Width/'0'-Block:

```
Z9-1   (26-mer):  5' – GGTAAGTTATCGGTGCTGACCAGAAC                         – 3'
Z9-2   (48-mer):  5' – GGTCAGCAGGATTCATTGATATGGTGCGACGTAGTTGCGTCCGATAAC   – 3'
Z9-3   (48-mer):  5' – GAGCGAGTCCATATCAATGAATCCACGCAACTACGTCGCAGGATGAAC   – 3'
Z9-4   (26-mer):  5' – TGAGTGTTCATCCACTCGCTCAGGAA                         – 3'
Z10-1V (26-mer):  5' – TTCCAGAGAAGTGGGTTAGTGAGT                           – 3'
Z10-2  (48-mer):  5' – CTAAACCCTGTCGCCTTACTCAGTGGAAACGCATCTACGGACTTCTGC   – 3'
Z10-3  (48-mer):  5' – GAATGAGGACTGAGTAAGGCGACACCGTAGATGCGTTTCCTGTTCTAG   – 3'
Z10-4  (26-mer):  5' – AATGGCTAGAACACCTCATTCGGTTA                         – 3'
Z11-1  (26-mer):  5' – ACTCACCGAACCACCCTTAGTAACC                          – 3'
Z11-2  (48-mer):  5' – CTAAAGGACTACAAATGTTATCACCGAGAGTATCTAGCCTGGTTCGG    – 3'
Z11-3  (48-mer):  5' – CGACTTCCTGATAACATTGTAGTGGCTAGATACTCTCGGACTAAGAG    – 3'
Z11-4  (26-mer):  5' – TGGAACTCTTAGTGGAAGTCGGTTCT                         – 3'
Z12-1V (26-mer):  5' – CCATTGTCTAAGGTGTATCGCTTCCT                         – 3'
Z12-2  (48-mer):  5' – GCGATACAGGCATAACGATTACGGTGTTGCATTTCCATGTCCTTAGAC   – 3'
Z12-3  (48-mer):  5' – CGAGATGTCCGTAATCGTTATGCCACATGGAAATGCAACAGGCGAAAC   – 3'
Z12-4  (26-mer):  5' – TTACCGTTTCGCCACATCTCGACTCA                         – 3'
```

Figure S12. Strand List part 0.

Double-Tiles:

```
Z56-1  (26-mer) :  5' – CGTTAGCTCGGCACCTCAAACATGTC – 3'
Z56-2  (48-mer) :  5' – GTTTGAGGACGCTATGAACATCCACCTAAGCAGAGACACCTGCCGAGC – 3'
Z56-3  (53-mer) :  5' – GCCTTCGATGACCTGTCTGGAGATGAGTGGTGAACCGCAGTAGGACGCCTCG – 3'
Z56-4H (39-mer) :  5' – TAACGCGAGGCGTGGTCATCGAAGGCCCTTTGGGCCTT – 3'
Z56-5  (74-mer) :  5' – CGGAAGCATTGGTGGTACTCGTGCTTGCTTTCGGACTCGATCTCCAGACACCTACTGCGGTTCACCTGCGAACG – 3'
Z56-6  (79-mer) :  5' – GTGATCGTTCGCACCGAAAGCAAGCACGAGTACCTGGATGTTCATAGCGTGGTGTCTCTGCTTAGGACCAATGCTTCCG – 3'
Z78-1  (26-mer) :  5' – AGGTTCTACCGCACCAGAATGCAAGA – 3' *
Z78-2  (48-mer) :  5' – CATTCTGGACGCCATAAGATAGCACCTGACTCATTGCTGCGGTAG – 3'
Z78-3  (53-mer) :  5' – CAGAAGCAGGAGTGTAGGCGATGGTGTTCGCTCTCAGTGTCCGATTGG – 3'
Z78-4  (26-mer) :  5' – AACCTCCAATCGTGCTTCTGTTCCT – 3'
Z78-5  (74-mer) :  5' – TTCCACGATCCGTGGCTACTGCGTCGGCCACGGTCCATCGCTCCACACTCCACACTGAGAGCGAACAGGACGAAG – 3'
Z78-6  (74-mer) :  5' – CATACCTTCGTCCACCGTGCCGACACGAGTAGCCCGTGCTATCTTATGGCGTGGCAAATGAGTCGAGGACGGATCG – 3'
```

* – The Z78-1 strand is used for variable-width experiments.
Z78-1 has no hairpin, which allows the Z7-Z8 double-tile to bind to
origami seed adaptor strands via two sticky-ends on its LHS.

-- COPY System – Tile Strand Sequences --

All strands from Variable-Width System (Except for Z78-1) in addition to –
Z78-1H (39-mer): 5' – AGGTTCTACCGCACCAGAATGCAAGACCTTTTGGTCTTG – 3' *
'1'-Block:

```
ZA-1   (26-mer) :  5' – TGGAACTGACCTTGCAGCACGATGAC – 3'
ZA-2   (70-mer) :  5' – CGTGCTGCTCAGGCTCCGTCTCGCTTTGCGAGACGTTAGTAGGTGTGTCCGAATGGCTGGTGAAGGTCAG – 3'
ZA-3   (70-mer) :  5' – CGAAGCTGAACCTACTGGCACGGCTTTTGCGTGCCTGAGCCTGACCAGCCATTCGGACTTGGAGGC – 3'
ZA-4   (26-mer) :  5' – GAGATGCCTCCAACAGCTTCGAGCAT – 3'
ZB-1   (26-mer) :  5' – ATCTCGTGACTCCATCGCATCAGGAA – 3'
ZB-2   (70-mer) :  5' – GATGCGATCCGACCATCCTAGCACAGCAGCCTCCGAAGCGTTTCGCTTGCGAAGCGTTTTGCCAGAGTAGGAGTCAC – 3'
ZB-3   (70-mer) :  5' – GTGGTTGAGTGCTAGGATGGTCGGTACTCGTCGTGGCTTTTGCCACGACTTAGGCTGCTCCGTATCC – 3'
ZB-4   (26-mer) :  5' – ATGACGGATACGGTCAACCACGTCAT – 3'
ZC-1   (26-mer) :  5' – TCAGACGTTCCGACCACACTCATGCT – 3'
ZC-2   (70-mer) :  5' – GAGTGTGGAACCTGTCCAAGACGACCGCACCTGGCAAGCGTTTCGCCTTCAGCCACCTCGGAACG – 3'
ZC-3   (70-mer) :  5' – CAGTCGCCTCGTCTTGGACAGGTTGGTGGCTGCGTTTCGCCTAGCGTTTCGCACGGTTAGGTGCGGATAGGAGC – 3'
ZCV-4  (26-mer) :  5' – TTCCAGCTCCTATGGCGACTGACACA – 3'     ZD-1   (26-mer) :  5' – GTCATGCTACGCCACAAGCAGTGTGT – 3'
ZD-2   (70-mer) :  5' – CTGCTTGTCCTCGAACGGTCGCTGTTTTCAGCGACCTTGGAATGCCACCAGACCTCTGCGAAGGCGTAGC – 3'
ZD-3   (70-mer) :  5' – GTCCATCAGGCATTCCGTGGAGCGTTTTCGCTCCACTTGTTCGCTACCTGTTGCGAGGTTCGCAGAGGTCTGGTCCGTTGCG – 3'
```

Figure S13. Strand List part 1.

ZDV-4   (26-mer):   5' - TCTGACGCAACGGTGATGGACTTCCT - 3'
* - COPY and Binary Counter experiments used the Z78-1H strand to add
  a hairpin to the Z7-Z8 tile at the position shown in Supp. Mat. Figure 1.

-- Binary Counter System - Tile Strand Sequences --

All strands from COPY System (except for Z78-3 & Z78-4) in addition to -
Z78-3-SP   (46-mer):   5' - GAAGCAGGAGTGTAGGCGATGGTGTTCGCTCTCAGTGTCCGATTGG - 3'
Z78-4BC-SP (24-mer):   5' - AACCTCCAATCGTGCTTCGATAG - 3'
ZF-1BC-SP (28-mer):   5' - TGAGTCTGACAGACGGCACAGTGCTATC - 3'
ZF-2-SP   (72-mer):   5' - CACTGTGCCGAGCATCGCCAGCACTACCACGCCTCGTCTCCGTTTCGGAGACGTTCTCGTAGCTCTGTCAG - 3'
ZF-3   (70-mer):   5' - CAAGGCTCTAGTGCTGCGATGCTGCTACGAGCGGAACCGTTTTCGGTTCCGTTAGGCGTGGACCATGAG - 3'
ZF-4BC   (26-mer):   5' - CAAACCTCATGGTGAGCCTTGGTCAT - 3'
ZH-1BC   (26-mer):   5' - GTTTGGACACTCCACCTCAACACTCA - 3'
ZH-2   (70-mer):   5' - GTTGAGGTCCAGTTGGCGACTCCGTTTTCGGAGTCGTTCACAGTCCACCGATCTGCCTCGTAGGAGTGTC - 3'
ZH-3   (70-mer):   5' - GTGAGACAGGACTGTGGCGAGCCGTTTTCGGCGTTTCCAACTGGTACGAGGCAGATCGGTCAAGGACC - 3'
ZH-4BC   (26-mer):   5' - TCTGAGGTCCTTGTGTCTCACTTCCT - 3'
ZG-1BC-SP (28-mer):   5' - ATCTCGCCAAGGCAGGACTTCTGCTATC - 3'
ZG-2BC-SP (50-mer):   5' - CAGAAGTCCTCGAGACTGTAGCTGGCAATCCGTCGGTGCTCAGCCTTGGC - 3'
ZG-3BC   (48-mer):   5' - GCCTGGAAGCCAGCTACAGTCTCGTGAGCACCGACGGATTCGACTAGC - 3'
ZG-4BC   (26-mer):   5' - CTATCGCTAGTCGTTCCAGGCAGAAC - 3'
ZE-1BC   (26-mer):   5' - GATAGCTGCATCTGTCCTCAGTGTGT - 3'
ZE-2BC   (48-mer):   5' - CTGAGGACTCTCGACGGGTCAGGTGATCCGAACTCCAGCGAGATGCAG - 3'
ZE-3BC-SP (46-mer):   5' - TGTGAGACCTGACCCGTGCAGACGCTGGAGTTCGGATCTGGCAACG - 3'
ZE-4BC-SP (24-mer):   5' - CCATTCGTTGCCACTCACAGATAG - 3'

-- Adapter Strand Sequences --

Variable-Width System Adaptor Strands:
AT1-2   (48-mer):   5' - CCAAGCGGTGAAAGTATTAAGAGGCTATTATTCTGAAACAGAGTCGGG - 3'
AT2-2   (48-mer):   5' - GGCACCCTGTCAGACGATTGGCCTCAGGAGGTTGAGGCAGTGCGGGCT - 3'
AT3-2   (48-mer):   5' - GTCCAGATGCGTCAGACTGTAGCGATCAAGTTTGCCTTTACGGTTACG - 3'
AT4-2   (48-mer):   5' - ACACACGGAGACAAAAGGGCGACAGTTTACCAGCGCCAACATCGCAT - 3'
AT5-2   (48-mer):   5' - GCGGAAGCGCAGATAGCCGAACAATTTTAAGAAAAGTAACACCTTAC - 3'
AT6-2   (48-mer):   5' - GGAGGACCAACGTCAAAAATGAAAAAACGATTTTTTGTTGTGGAGTT - 3'

```
AT7-2     (48-mer):  5' - GTCCTAGTGCTTATCCGGTATTCTAAAATCAGATATAGAAGTGGGCAGC  - 3'
AT8-2     (48-mer):  5' - CTGTGACTACGCGCCTGTTTATCAGTTCAGCTTCAGCTAATGCAGAGGGGTGGG  - 3'
AT9-2     (48-mer):  5' - CAATGTGCGAAAAAGCCTGTTTAGGGAATCATAATTACTACGGAGCCC  - 3'
AT10-2    (48-mer):  5' - GCATGTCCCATAGGTCTGAGAGACGTGAATTTATCAAAATACGCGAGC  - 3'
AT11-2    (48-mer):  5' - GTACAACCGAAGATGATGAAACAAAATTACCTGAGCAAAACTACGAGG  - 3'
AT12-2    (48-mer):  5' - GGGTACTGACTTCTGAATAATGATGATGATTGTTTGGATTATGGTGAGTC  - 3'
AT13-2    (48-mer):  5' - AGTGGTAGGCCGTCAATAGATAATCAACTAATAGATTAGACATCGAGA  - 3'
AT14-2    (48-mer):  5' - GACCCGGCCCAGCAGAAGATAAAAAATACCGAACGAACCAGTGTCGAA  - 3'
AT15-2    (48-mer):  5' - CTCGGGGACTACATTTGACGCTCACGCTCATGGAAATACTCGTGCAA  - 3'
AT16-2    (48-mer):  5' - TATGCCCCAGGAACGTACGCCATTAAAGGGATTTTAGATCACTCGC  - 3'
AT1-3V    (21-mer):  5' - TAACGCCGACTCCCGCTTGG  - 3'
AT2-3V    (26-mer):  5' - GACTTAGCCCGCAAGGGTGCCGACAT  - 3'
AT3-3V    (26-mer):  5' - ACAAGCGTAACCGATCTGGACAATCG  - 3'
AT4-3V    (26-mer):  5' - CCATTATGCGATGCCGTGTTTCCT  - 3'
AT5-3V    (26-mer):  5' - ACTCAGTAAGGTGGCTTCCGCTAACC  - 3'
AT6-3V    (26-mer):  5' - CCATTAACTCCACGGTCCTCCTTCCT  - 3'
AT7-3V    (26-mer):  5' - ACTCAGCTGCCCAACTAGGACTAACC  - 3'
AT8-3V    (26-mer):  5' - CCATTCCCACCCCAGTCACAGTTCCT  - 3'
AT9-3V    (26-mer):  5' - ACTCAGGGCTCCGGCACATTGTAACC  - 3'
AT10-3V   (26-mer):  5' - CCATTGCTCGCGTGGACATGCTTCCT  - 3'
AT11-3V   (26-mer):  5' - ACTCACCTCGTAGGGTTGTACTAACC  - 3'
AT12-3V   (26-mer):  5' - AACCTGACTCACCCAGTACCCTTCCT  - 3'
AT13-3V   (21-mer):  5' - TCTCGATGCTACCACTTCTTG  - 3'
AT8-3V8   (26-mer):  5' - AACCTCCCACCCCAGTCACAGTTCCT  - 3'  *
AT9-3V8   (21-mer):  5' - GGGCTCCGGCACATTGTCTTG  - 3'  *
AT10-3V10 (26-mer):  5' - AACCTGCTCGCGTGGACATGCTTCCT  - 3'  **
AT11-3V10 (21-mer):  5' - CCTCGTAGGGTTGTACTCTTG  - 3'  **
```

If an AT#-3... strand is used, the AT#-2 strand must also be added.

To nucleate 8W ribbons add AT8-3V8 & AT9-3V8 (Marked with (*)) instead of AT8-3V & AT9-3V.
Do not add any strands with prefix AT# where # > 9.

To nucleate 10W ribbons add AT10-3V10 & AT11-3V10 (Marked with (**)) instead of AT10-3V & AT11-3V.
Do not add any strands marked with (*) or with prefix AT# where # > 11.

To nucleate 12W ribbons, add all strands except for those marked with (*) or (**).
Do not add any strands with prefix AT# where # > 13.

Figure S15. Strand List part 3.

COPY System Adaptor Strands:

We represent the bit string displayed on the ribbon as ('A–B–C–D–E–F'), where all
variables can be set to either '0' or '1'. 'A' is the position closest to the
Z7–Z8 double–tile at the top of the ribbon (See Figure 4 in main text).
To program the bit string one wishes to nucleate, add the following strands
along with all AT#–2 strands (1–16) –

Bit String Invariant Strands:

AT16–3VWCOPY   (26–mer):   5' – AACCTGCGAGTGAGGGGCATATTCCT – 3'
AT3–3V   (26–mer):   5' – ACAAGCGTAACCGATCTGGACAATCG – 3'
AT2–3V   (26–mer):   5' – GACTTAGCCCGCAAGGGTGCCGACAT – 3'
AT1–3VWCOPY   (39–mer):   5' – TAACGCCCGACTCCCGCTTGGCAAGACCTTTTGGTCTTG – 3'

***

For A = 0:

AT15–3VWCOPY   (26–mer):   5' – ACTCATTGCACGATCCCGAGTAACC – 3'
AT14–3VWCOPY   (26–mer):   5' – CCATTTTCGACACGCCGGGTCTTCCT – 3'

For A = 1:

AT15–3VWCOPY(1–bit) (26–mer): 5' – GAGATTTGCACGATCCCGAGAGCAT – 3'
AT14–3VWCOPY(1–bit) (26–mer): 5' – TCTGATTCGACACGCCGGGTCTTCCT – 3'

***

For B = 0:

AT13–3VWCOPY(0–bit) (26–mer): 5' – ACTCATCTCGATGCTACCACTTAACC – 3'
AT12–3VWCOPY(0–bit) (26–mer): 5' – CCATTGACTCACCCAGTACCCTTCCT – 3'

For B = 1:

AT13–3VWCOPY   (26–mer):   5' – GAGATTCTCGATGCTACCACTAGCAT – 3'
AT12–3VWCOPY   (26–mer):   5' – TCTGAGACTCACCCAGTACCCTTCCT – 3'

***

Figure S16. Strand List part 4.

```
For C = 0:
AT11-3V          (26-mer):   5' - ACTCACCTCGTAGGGTTGTACTAACC  - 3'
AT10-3V          (26-mer):   5' - CCATTGCTCGCGTGGACATGCTTCCT  - 3'

For C = 1:
AT11-3VWCOPY     (26-mer):   5' - GAGATCCTCGTAGGGTTGTACAGCAT  - 3'
AT10-3VWCOPY     (26-mer):   5' - TCTGAGCTCGCGTGGACATGCTTCCT  - 3'

***

For D = 0:

AT9-3VWCOPY      (26-mer):   5' - ACTCAGGGCTCCGGCACATTGTAACC  - 3'
AT8-3VWCOPY      (26-mer):   5' - CCATTCCCACCCCAGTCACAGTTCCT  - 3'

For D = 1:

AT9-3VWCOPY(1-bit) (26-mer): 5' - GAGATGGGCTCCGGCACATTGAGCAT  - 3'
AT8-3VWCOPY(1-bit) (26-mer): 5' - TCTGACCCACCCCAGTCACAGTTCCT  - 3'

***

For E = 0:

AT7-3V           (26-mer):   5' - ACTCAGCTGCCCAACTAGGACTAACC  - 3'
AT6-3V           (26-mer):   5' - CCATTAACTCCACGGTCCTCCTTCCT  - 3'

For E = 1:

AT7-3VWCOPY      (26-mer):   5' - GAGATGCTGCCCAACTAGGACAGCAT  - 3'
AT6-3VWCOPY      (26-mer):   5' - TCTGAAACTCCACGGTCCTCCTTCCT  - 3'

***

For F = 0:

AT5-3V           (26-mer):   5' - ACTCAGTAAGGTGGCTTCCGCTAACC  - 3'
AT4-3V           (26-mer):   5' - CCATTATGCGATGCCGTGTGTTTCCT  - 3'

For F = 1:

AT5-3VWCOPY(1-bit) (26-mer): 5' - GAGATGTAAGGTGGCTTCCGCAGCAT  - 3'
AT4-3VWCOPY(1-bit) (26-mer): 5' - TCTGAATGCGATGCCGTGTGTTTCCT  - 3'
```

Figure S17. Strand List part 5.

-- Sticky-End Sequences --

All sticky-end sequences used in this work are listed below (complements indicated by '*').
Green/Black/Gray etc. refer to the color of the dots used to indicate unique sticky-end groupings in
figures. While certain sticky-ends have counterparts with identical sequences (as indicated in the
'Identical Sequences' column) in all cases their protruding ends are of opposite polarity. Thus, due to
the presence of the tile, they are sterically blocked from binding to one-another's complement.

Name:	Sequence:		End Pointing Away From Tile:	Identical Sequences:
Green 1	5' - AGGAA - 3'	3'		
Green 2	5' - TGGAA - 3'	5'		
Green 1*	5' - TTCCT - 3'	3'		
Green 2*	5' - TTCCA - 3'	5'		
Black 1	5' - ATGTC - 3'	3'		
Black 2	5' - GTGAT - 3'	5'		
Black 1*	5' - GACAT - 3'	3'		
Black 2*	5' - ATCAC - 3'	5'		
Gray 1	5' - AACCT - 3'	5'		
Gray 1*	5' - AGGTT - 3'	5'		
Pink 1	5' - TAACG - 3'	5'		
Pink 1*	5' - CGTTA - 3'	5'		
Blue 1	5' - TTACC - 3'	5'		
Blue 2	5' - CCATT - 3'	5'		
Blue 3	5' - GGTTA - 3'	3'		
Blue 4	5' - AGAAC - 3'	3'		
Blue 5	5' - ACTCA - 3'	5'	Blue 6*
Blue 6	5' - TGAGT - 3'	3'	Blue 5*
Blue 7	5' - GATAG - 3'	5'	Hollow Green Dot 1*
Blue 1*	5' - GGTAA - 3'	5'	

Figure S18. Strand List part 6.

Name:	Sequence:	End Pointing Away From Tile:	Identical Sequences:
Blue 2*	5' - AATGG - 3'	5'	
Blue 3*	5' - TAACC - 3'	3'	
Blue 4*	5' - GTTCT - 3'	3'	
Blue 5*	5' - TGAGT - 3'	5'	Blue 6
Blue 6*	5' - ACTCA - 3'	3'	Blue 5
Blue 7*	5' - CTATC - 3'	5'	Hollow Green Dot 1
Red 1	5' - GTCAT - 3'	5'	Red 4
Red 2	5' - TCTGA - 3'	5'	
Red 3	5' - ATGCT - 3'	3'	Brown 1*
Red 4	5' - GTCAT - 3'	3'	Red 1
Red 5	5' - GAGAT - 3'	5'	
Red 6	5' - ACACA - 3'	3'	
Red 7	5' - GTTTG - 3'	5'	
Red 1*	5' - ATGAC - 3'	5'	Red 4*
Red 2*	5' - TCAGA - 3'	5'	
Red 3*	5' - AGCAT - 3'	3'	Brown 1
Red 4*	5' - ATGAC - 3'	3'	Red 1*
Red 5*	5' - ATCTC - 3'	3'	
Red 6*	5' - TGTGT - 3'	3'	
Red 7*	5' - CAAAC - 3'	5'	
Brown 1	5' - AGCAT - 3'	5'	Red 3*
Brown 2	5' - GACTT - 3'	5'	
Brown 3	5' - CGATT - 3'	3'	
Brown 4	5' - AAGAG - 3'	3'	
Brown 5	5' - ACAAG - 3'	5'	
Brown 6	5' - GCTAA - 3'	3'	
Brown 1*	5' - ATGCT - 3'	5'	Red 3
Brown 2*	5' - AAGTC - 3'	5'	
Brown 3*	5' - AATCG - 3'	3'	
Brown 4*	5' - CTCTT - 3'	3'	
Brown 5*	5' - CTTGT - 3'	5'	

Figure S19. Strand List part 7.

Name:	Sequence:	End Pointing Away From Tile:	Identical Sequences:
Brown 6*	5' – TTAGC – 3'	3'	
Hollow Green Dot 1	5' – CTATC – 3'	3'	Blue 7*
Hollow Green Dot 1*	5' – GATAG – 3'	3'	Blue 7
inert 1	5' – CAAGA – 3'	3'	
inert 1*	5' – TCTTG – 3'	3'	
inert 2	5' – CATAC – 3'	5'	

Figure S20. Strand List part 8.

```
            -- Origami Seed Strand Sequences --

All strand sequences for the origami seed were taken from the Supp. Mat. of ref. 15 (See main text for
reference).  See Supplementary Figure S35/S36 in ref. 15 for additional diagrams of "tall rectangle"
origami.  In this work, staple strands on the left-most and right-most side of the "tall rectangle" origami
are not used to allow for the placement of tile adapter strands and to prevent stacking interactions.
See ref. 15 for more thorough description of stacking interactions between origami.

"Tall Rectangle" Origami Strand Sequences:
Strand Name    Plate Position      Sequence (5' - 3')                          Length (nt)
Plate number: 1

t1r0g          A1                  AGGGTTGATATAAGTATAGCCCGGAATAGGTG            32
t1r10e         B1                  TGAACAAAGATAACCCACAAGAATAAGACTCC            32
t1r10f         C1                  ATCAGAGAGTCAGAGGGTAATTGAACCAGTCA            32
t1r12e         D1                  TATTTTGCACGCTAACGAGCGTCTGAACACCC            32
t1r12f         E1                  TCTTACCAACCCAGCTACAATTTAAAGAAGT             32
t1r14e         F1                  ATCGGCTGACCAAGTACCGCACTCTTAGTTGC            32
t1r14f         G1                  GGTATTAATCTTTCCTTATCATTCATATCGCG            32
t1r16e         H1                  CATATTTATTTCGAGCCAGTAATAAATCAATA            32
t1r16f         A2                  AGAGGCATACAACGCCAACATGTATCTGCGAA            32
t1r18e         B2                  ACAAAGAAAATTTCATCTTCTGACAGAATCGC            32
t1r18f         C2                  TTTTAGTTCGCGAGAAAACTTTTTTTATGACC            32
t1r20e         D2                  AAATCAATCGTCGCTATTAATTAAATCGCAAG            32
t1r20f         E2                  CTGTAAATATATGTGAGTGAATAAAAAGGCTA            32
t1r22e         F2                  TTTAACGTTCGGGAGAAAACAATAACAGTACAT           32
t1r22f         G2                  CTTTTACACAGATGAATATACAGTGCCATCAA            32
t1r24e         H2                  TTATTAATGAACAAAGAAACCACCTTTTCAGG            32
t1r24f         A3                  ATTTTGCGTTAAAAGTTTGAGTACCGGCACC             32
t1r26e         B3                  CTAAAGCAAATCAATATCTGGTCACCCGAACG            32
t1r26f         C3                  AAACCCTCTCACCTTGCTGAACCTAGAGGATC            32
t1r28e         D3                  GCCAACAGATACGTGGCACAGACATGAAAAAT            32
```

Figure S21. Strand List part 9.

t1r28f	E3	GCGTAAGAAGATAGAACCCTTCTGAACGCGCG	32
t1r2e	F3	TAAGCGTCGGTAATAAGTTTAACCCGTCGAG	32
t1r2f	G3	AGTGTACTATACATGGCTTTTGATCTTTCCAG	32
t1r30e	H3	GTTGTAGCCCTGAGTAGAAGAACTACATTCTG	32
t1r30f	A4	ATCACTTGAATACTTCTTTGATTAGTTGTTCC	32
t1r32h	B4	TACAGGGCGCGTACTATGGTTGCTAATTAACC	32
t1r4e	C4	AACCAGAGACCCTCAGAACCGCCACGTTCCAG	32
t1r4f	D4	GAGCCGCCCACCACCGGAACCGCTGCGCCGA	32
t1r6e	E4	GACTTGAGGTAGCACCATTACCATATCACCGG	32
t1r6f	F4	AATCACCACCATTTGGGAATTAGACCAACCTA	32
t1r8e	G4	TTATTACGTAAAGGTGGCAACATACCGTCACC	32
t1r8f	H4	TACATACACAGTATGTTAGCAAACTGTACAGA	32
t3r0g	A5	TGCTCAGTACCAGGCGGATAAGTGGGGTCAG	32
t3r10e	B5	GCGCATTAATAAGAGCAAGAAACAATAACGGA	32
t3r10f	C5	GCCCAATAGACGGGAGAATTAACTTTCCAGAG	32
t3r12e	D5	AGGTTTTGGCCAGTTACAAAATAAACAGGGAA	32
t3r12f	E5	CCTAATTTAAGCCTTAAAATCAAGAATCGAGAA	32
t3r14e	F5	CTAATTTACCGTTTTTATTTTCATCTTGCGGG	32
t3r14f	G5	CAAGCAAGCGAGCATGTAGAAACCAGAGAATA	32
t3r16e	H5	ACGCTCAACGACAAAAGGTAAAGTATCCCATC	32
t3r16f	A6	TAAAGTACCAGTAGGGCTTAATTGCTAAATTT	32
t3r18e	B6	TATGTAAAGAAATACCGACCGTGTTAAAGCCA	32
t3r18f	C6	AATGGTTTTGCTGATGCCAAATCCATTTTCCCT	32
t3r20e	D6	TTGAATTATTGAAAACATAGCGATTATAACTA	32
t3r20f	E6	TAGAATCCCCTTTTTTAATGGAAACGGATTCG	32
t3r22e	F6	ACAGAAATCTTTGAATACCCAAGTTAATTTCAT	32
t3r22f	G6	CCTGATTGAAAGAAATTGCGTAGAAGAAGGAG	32
t3r24e	H6	CGACAACTTCATCATATTCCTGATCACGTAAA	32
t3r24f	A7	CGGAATTACGTATTAAATCCTTTGGTTGGCAA	32
t3r26e	B7	GCCACGCTTTGAAAGGAATTGAGGAAACAATT	32
t3r26f	C7	ATCAACAGGAGAGCCAGCAGCAAAATATTTTT	32
t3r28e	D7	GTCACACGATTAGTCTTTAATGCGGCAACAGT	32

Figure S22. Strand List part 10.

t3r28f	E7	GAATGGCTACCAGTAATAAAAGGGCAAACTAT	32
t3r2e	F7	GGAAAGCGGTAACAGTGCCCGTATCGGGGTTT	32
t3r2f	G7	TGCCTTGACAGTCTCTGAATTTACCCCTCAGA	32
t3r30e	H7	GTAAAAGACTGGTAATATCCAGAAATTCACCA	32
t3r30f	A8	CGGCCTTGGTCTGTCCATCACGCATTGACGAG	32
t3r32h	B8	CACGTATAACGTGCTTTCCTCGTTGCCACCGA	32
t3r4e	C8	GTTTGCCACCTCAGAGCCGCCACCGCCAGAAT	32
t3r4f	D8	GCCACCACTCTTTTCATAATCAAATAGCAAGG	32
t3r6e	E8	TTATTCATGTCACCAATGAAACCATTATTAGC	32
t3r6f	F8	CCGGAAACTAAAGGTGAATTATCATAAAAGAA	32
t3r8e	G8	ATACCCAAACACCACGGAATAAGTGACGGAAA	32
t3r8f	H8	ACGCAAAGAAGAACTGGCATGATTTGAGTTAA	32
t5r0g	A9	CCTCAAGAGAAGGATTAGGATTAGAAACAGTT	32
t5r10e	B9	CTTTACAGTATCTTACCGAAGCCCAGTTACCA	32
t5r10f	C9	GCAATAGCAGAGAATAACATAAAAACAGCCAT	32
t5r12e	D9	GAGGCGTTTCCCAATCCAAATAAGATAGCAGC	32
t5r12f	E9	ATTATTTATTAGCGAACCTCCCGACGTAGGAA	32
t5r14e	F9	TAAGTCCTGCGCCCAATAGCAAGCAAGAACGC	32
t5r14f	G9	TCATTACCGACAAGAAAAATAATAATTCTGT	32
t5r16e	H9	GCGTTATACGACAATAAACAACATACAATAGA	32
t5r16f	A10	CCAGACGACAAATTCTTACCAGTAGATAAATA	32
t5r18e	B10	TAACCTCCAATAAGAATAAACACCTATCATAT	32
t5r18f	C10	AGGCGTTAGGCTTAGGTTGGGTTAAGCTTAGA	32
t5r20e	D10	AAAACAAACTGAGAAGAGTCAATATACCTTTT	32
t5r20f	E10	TTAAGACGATTAATTACATTTAACACAAAATC	32
t5r22e	F10	AACCTACCGCGAATTATTCATTTCACATCAAG	32
t5r22f	G10	GCGCAGAGATATCAAAATTATTTGTATCAGAT	32
t5r24e	H10	GGATTTAGTTCATCAATAATAATCCAGGGTTAG	32
t5r24f	A11	GATGGCAAAAGTATTAGACTTTACAAGGTTAT	32
t5r26e	B11	AGGCGGTCTCTTTAGGAGCACTAAACATTTGA	32
t5r26f	C11	CTAAAATAAGTATTAACACCGCCTCGAACTGA	32
t5r28e	D11	GAAATGGAAAACATCGCCATTAAACAGAGGTG	32

Figure S23. Strand List part 11.

t5r28f	E11	TAGCCCTATTATTTACACATTGGCAGCAATATTA	32
t5r2e	F11	ACAAACAACTGCCTATTTCGGAACCTGAGACT	32
t5r2f	G11	AATGCCCCATAAATCCTCATTAAAAGAACCAC	32
t5r30e	H11	AGAAGTGTCATTGCAACAGGAAAAAATCGTCT	32
t5r30f	A12	CCGCCAGCTTTTATAATCAGTGAGAGAATCAG	32
t5r32h	B12	AGCGGGAGCTAAACAGGAGGCCGAGAATCCTG	32
t5r4e	C12	TCGGCATTCCGCCGCCAGCATTGATGATATTC	32
t5r4f	D12	CACCAGAGTTCGGTCATTAGCCCCCTCGATAGC	32
t5r6e	E12	ATTGAGGGAATCAGTAGCGCACAGACGTTTTCA	32
t5r6f	F12	AGCACCGTAGGGAAGTAAAAATATTTATTTTTG	32
t5r8e	G12	GAAGGAAAAATAGAAAATTCATATTTCAACCG	32
t5r8f	H12	TCACAATCCCGAGGAAACGCAATAATGAAATA	32

Plate number: 2

t-1r0g	A3	TATCACCGTACTCAGGAGGTTTAGATAGTTAG	32
t-1r10e	B3	GGACGTTGAGAACTGGCTCATTATGCGCTAAT	32
t-1r10f	C3	CGATTTTAGGAAGAAAAATCTACGGATAAAAA	32
t-1r12e	D3	TTTGCCAGGCGAGAGGCTTTTGCAATCCTGAA	32
t-1r12f	E3	CCAAAATAAGGGGGTAATAGTAAAAAAAGATT	32
t-1r14e	F3	TTTTAATTGCCCGAAAGACTTCAACAAGAACG	32
t-1r14f	G3	AAGAGGAACGAGCTTCAAAGCGAAAGTTTCAT	32
t-1r16e	H3	CGAGTAGAACAGTTGATTCCCAATATTTAGGC	32
t-1r16f	A4	TCCATATATTTAGTTTGACCATTAAGCATAAA	32
t-1r18e	B4	CTGTAATAGTTGTACCAAAAACACAAATATA	32
t-1r18f	C4	GCTAAATCCTTTTGCGGGAGAAGCCCGGAGAG	32
t-1r20e	D4	TCAGGTCATTTTGAGAGATCTACCCTTGCTT	32
t-1r20f	E4	GGTAGCTATTGCCTGAGAGTCTGGTTAAATCA	32
t-1r22e	F4	AAATAATTTTAACCAATAGGAACAACAGTAC	32
t-1r22f	G4	GCTCATTTCGCGTCTGGCCTTCCTGGCCTCAG	32
t-1r24e	H4	GCTTCTGGCACTCCAGCCAGCTTTACATTATC	32
t-1r24f	A5	GAAGATCGTGCCGGAAACCAGGCAGTGCCAAG	32
t-1r26e	B5	CCCGGGTACCTGCAGGTCGACTCTCAAATATC	32

Figure S24. Strand List part 12.

t-1r26f	C5	CTTGCATGCCGAGCTCGAATTCGTCCTGTCGT	32
t-1r28e	D5	GGGAGAGGCATTAATGAATCGGCCACCTGAAA	32
t-1r28f	E5	GCCAGCTGCGGTTTGCGTATTGGGAATCAAAA	32
t-1r2e	F5	ACGTTAGTTCTAAAGTTTTGTCGTGATACAGG	32
t-1r2f	G5	CGTAACGAAAATGAATTTCTGTAGTGAATTT	32
t-1r30e	H5	AGTTTGGACGAGATAGGGTTGAGTGTAATAAC	32
t-1r30f	A6	GAATAGCCACAAGAGTCCACTATTAAGCCGGC	32
t-1r32h	B6	GAACGTGGCGAGAAAGGAAGGGAATGCGCCGC	32
t-1r4e	C6	CAATGACAGCTTGATACCGATAGTCTCCCTCA	32
t-1r4f	D6	CTTAAACAACAACCATCGCCCACGCGGTAAA	32
t-1r6e	E6	AAACGAAATGCCACTACGAAGGCAGCCAGCAA	32
t-1r6f	F6	ATACGTAAGAGCAAAAGAATACACTGACCAA	32
t-1r8e	G6	CCAGGCGCGAGGACAGATGAACGGGTAGAAAA	32
t-1r8f	H6	CTTTGAAAATAGGCTGGCTGACCTACCTTATG	32
t-3r0g	A7	CCCTCAGAACCGCCACCCTCAGAAACAACGCC	32
t-3r10e	B7	ACGAACTATTAATCATTGTGAATTTCATCAAG	32
t-3r10f	C7	TTTCAACTACGGAACAACATTATTAACACTAT	32
t-3r12e	D7	ACTGGATATCGTTTACCAGACGACTTAATAAA	32
t-3r12f	E7	CATAACCCGCGTCCAATACTGCGGTATTATAG	32
t-3r14e	F7	GAAGCAAAAAGCGGATTGCATCAATGTTTAG	32
t-3r14f	G7	TCAGAAGCCTCCAACAGGTCAGGATTTAAATA	32
t-3r16e	H7	TCGCAAATAAGTACGGTGTCTGGACCAGACCG	32
t-3r16f	A8	TGCAACTAGGTCAATAACCTGTTTAGAATTAG	32
t-3r18e	B8	CAACGCAAAGCAATAAAGCCTCAGGATACATT	32
t-3r18f	C8	CAAAATTAGGATAAAAATTTTTAGGATATTCA	32
t-3r20e	D8	AGAGAATCAGCTGATAAATTAATGCTTTATTT	32
t-3r20f	E8	ACCGTTCTGATGAACGGTAATCGTAATATTTT	32
t-3r22e	F8	CTTTCATCTCGCATTAAATTTTGAGCAAACA	32
t-3r22f	G8	GTTAAAATAACATTAAATGTGAGCATCTGCCA	32
t-3r24e	H8	TTCGCCATGGACGACGACAGTATCGTAGCCAG	32
t-3r24f	A9	GTTTGAGGTCAGGCTGCGCAACTGTTCCCAGT	32
t-3r26e	B9	TCATAGCTTGTAAAACGACGCCCAAAGCGCCA	32

Figure S25. Strand List part 13.

t-3r26f	C9	CACGACGTGTTCCTGTGTGAAATTTGCGCTC	32
t-3r28e	D9	TGGTTTTCTTTCCAGTCGGGAAAAATCATGG	32
t-3r28f	E9	ACTGCCCGCTTTTCACCAGTGAGATGGTGGTT	32
t-3r2e	F9	TGCTAAACTCCACAGACAGCCCTCTACCGCCA	32
t-3r2f	G9	TGTAGCATAACTTTCAACAGTTTCTAATTGTA	32
t-3r30e	H9	TGGACTCCGGCAAAATCCCTTATACGCCAGGG	32
t-3r30f	A10	CCGAAATCAACGTCAAAGGGCGAAAAGGGAGC	32
t-3r32h	B10	CCCCGATTTAGAGCTTGACGGGGAAAAGAACG	32
t-3r4e	C10	ATATATTTCTCAGCTTGCTTTCGAGTGGGATTT	32
t-3r4f	D10	TCGGTTTAGTGCTGCTGAGGCTTGCAAAGACTT	32
t-3r6e	E10	CTCATCTTGGAAGTTTCCATTAAAACATAACCG	32
t-3r6f	F10	TTTCATGATGACCCCCAGCGATTAAGGCGCAG	32
t-3r8e	G10	AGTAATCTTCATAAGGGAACCGAACTAAAACA	32
t-3r8f	H10	ACGGTCAATGACAAGAACCGGATATGGTTTAA	32
t-5r0g	A11	CTCAGAGCCACCACCCTCATTTTCCGTAACAC	32
t-5r10e	B11	AAAGATTCTAAATTGGGCTTGAGATTCATTAC	32
t-5r10f	C11	ACGAGTAGATCAGTTGAGATTTAGCGCCAAAA	32
t-5r12e	D11	TAAATATTGAGGCATAGTAAGAGCACAGGTAG	32
t-5r12f	E11	GGAATTACCATTGAATCCCCCTCACCATAAAT	32
t-5r14e	F11	TACCTTTAAGGTCTTTACCCTGACAATCGTCA	32
t-5r14f	G11	CAAAAATCATTGCTCCTTTTGATAATTGCTGA	32
t-5r16e	H11	TTTCATTTCTGTAGCTCAACATGTTTAGAGAG	32
t-5r16f	A12	ATATAATGGGGCGCGAGCTGCAAATTAACATC	32
t-5r18e	B12	TATATTTTCATACAGGCAAGGCAAAGCTATAT	32
t-5r18f	C12	CAATAAATAAATGCAATGCCTGAGAAGGCCGG	32
t-5r20e	D12	CATGTCAAAAATCACCATCAATATAACCCTCA	32
t-5r20f	E12	AGACAGTCTCATATGTACCCCGGTTTGTATAA	32
t-5r22e	F12	ACCCGTCGTTAAATTGTAAACGTTAAAACTAG	32
t-5r22f	G12	GCAAATATGATTCTCCGTGGGAACCGTTGGTG	32
t-5r24e	H12	GGCGATCGCGCATCGTAACCGTGCGAGTAACA	32

Figure S26. Strand List part 14.

Plate number: 3

t-5r24f	A1	TAGATGGGGTGCGGGCCTCTTCGCGCAAGGCG	32
t-5r26e	B1	GCTCACAAGGGTAACGCCAGGGTTTTGGGAAG	32
t-5r26f	C1	ATTAAGTTTTCCACACAACATACGCCTAATGA	32
t-5r28e	D1	AGCTGATTACTCACATTAATTGCGTGTTATCC	32
t-5r28f	E1	GTGAGCTAGCCCTTCACCGCCTGGGGTTTGCC	32
t-5r2e	F1	GAGAATAGGTCACCAGTACAAACTCCGCCACC	32
t-5r2f	G1	TGAGTTTCAAAGGAACAACTAAAGATCTCCAA	32
t-5r30e	H1	TATCAGGGCGAAAATCCTGTTTGACGGGCAAC	32
t-5r30f	A2	CCAGCAGGCGATGCCCACTACGTGAGTGCC	32
t-5r32h	B2	GTAAAGCACTAAATCGGAACCCTAAAACCGTC	32
t-5r4e	C2	AAAGGCCGCTCCAAAAGGAGCCTTAGCGGAGT	32
t-5r4f	D2	AAAAAAGGCTTTTGCGGGATCGTCGGGTAGCA	32
t-5r6e	E2	GCGAAACAAGAGGCTTTGAGGACTAGGGAGTT	32
t-5r6f	F2	ACGGCTACAAGTACAACGGAGATTCGCGACCT	32
t-5r8e	G2	CCAAATCATTACTTAGCCGGAACGTACCAAGC	32
t-5r8f	H2	GCTCCATGACGTAACAAAGCTGCTACACCAGA	32
tr-rem1	A5	GCGCTTAA	8

Figure S27. Strand List part 15.