

Electronic Supplementary Information

prepared for the manuscript

An Easy-to-Prepare Mini-Scaffold for DNA Origami

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Figure S1. Flow chart showing the overall scaffold preparation, starting with growth of *E. coli* S3131 (which constitutively produces and secretes miniM13 phage particles) and ending with purified ssDNA. Note that following PEG fractionation the phases are referred to as “pellet” and “supernatant” inside quotation marks because a true precipitate will not form. Further details of each of the steps is provide in the Experimental Section of the main text.

Regarding Further Alterations to the Scaffold Size:

To modulate the length of the mini-M13 scaffold, the size of pSB4434 can be altered. A larger version would be easy to prepare as it bears a unique restriction recognition site replacing the deleted material. Not only could a DNA fragment with XhoI ends be inserted but synthetic oligonucleotide(s) of predefined sequence could also be inserted. The synthetic oligonucleotides could be designed to provide new structural potentials when folded into origami shapes. It may be difficult to prepare a shorter version of pSB4434 as most of what is left are the single- and double-stranded origins of replication and the gene for resistance to ampicillin. Replacing bla, the gene for ampicillin-resistance with a smaller gene to assure maintenance of the mini-M13 plasmid may be possible, however it could reduce the current simplicity of production.

Scaffold Strand Sequence:

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ACGCGCCCTGTAGCGGCGCTTTAAGCGCGGCGGGTGTGGTGGTTACGCGCAGCGTGACCGCTACACTTGCCAGCG
CCCTAGCGCCCGCTCCTTTTCGCTTTCTTCCCTTCTTCTCGCCACGTCGCCGGCTTTCCCCGTCAAGCTCTAAATCG
GGGGCTCCCTTTAGGGTTCGATTAGTGCTTACGGCACCTCGACCCAAAAAACTTGATTAGGGTGATGGTTCA
CGTAGTGGGCCATCGCCCTGATAGACGGTTTTTCGCCCTTGACGTTGGAGTCCACGTTCTTAATAGTGGACTCTT
GTTCCAACTGGAACAACACTCAACCCTATCTCGGTCTATTCTTTTGATTATAAGGGATTTTGCCGATTCGGCCTA
TTGGTTAAAAAATGAGCTGATTTAACAAAAATTTAACGCGAATTTTAACAAAATATTAACGCTTACAATTTCCATTC
GCCATTCAGGCTGCGCAACTGTTGGGAAGGGCGATCGGTGCGGGCCTCTTCGCTATTACTCGAGCGGTATCAGCT
CACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAACATGTGAGCAAAAGGCCA
GCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGGCGTTTTTTCATAGGCTCCGCCCCCTGACGAGCATCA
CAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAG
CTCCCTCGTGCGCTCTCCTGTTCCGACCCTGCCGCTACCGGATACCTGTCCGCCTTCTCCCTTCGGGAAGCGTGG
CGTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTTCGCTCCAAGCTGGGCTGTGTGCACGAA
CCCCCGTTTCAGCCCGACCGCTGCGCCTTATCCGGTAACATATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATC
GCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGT
GGTGGCCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAA
AAGAGTTGGTAGCTCTTGATCCGGCAAACAACACCGCTGGTAGCGGTGGTTTTTTGTTTGCAAGCAGCAGATT
ACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAAC
TCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTACCTAGATCCTTTAAATTAATAAATGAAGTTT
TAAATCAATCTAAAGTATATATGAGTAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAG
CGATCTGTCTATTTTCGTTTCATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCA
TCTGGCCCCAGTGCTGCAATGATACCGCGAGACCCACGCTCACC GGCTCCAGATTTATCAGCAATAAACCAGCCAG
CCGGAAGGGCCGAGCGCAGAAAGTGGTCCTGCAACTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGGGAAGC
TAGAGTAAGTAGTTCGCCAGTTAATAGTTTTCGCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCG
TCGTTTGGTATGGCTTCATTCAGCTCCGGTTCCCAACGATCAAGGCGAGTTACATGATCCCCCATGTTGTGCAAAAA
AGCGGTTAGCTCCTTCGGTCTCCGATCGTTGTGAGAAGTAAGTTGGCCGAGTGTTATCACTCATGGTTATGGCA
GCACTGCATAATTCTTACTGTATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAGTACTCAACCAAGTCATT
CTGAGAATAGTGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCGCCACATAGCAG
AACTTTAAAGTGCTCATCATTGAAAACGTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCGCTGTTGAGATCC
AGTTCGATGTAACCCACTCGTGACCCAACTGATCTTCAGCATCTTTTACTTTCACCAGCGTTTCTGGGTGAGCAAA
AAACAGGAAGGCAAAATGCCGCAAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTT
TTCAATATTATTGAAGCATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGTATTTAGAAAAATAAA
CAAATAGGGGTTCCGCGCACATTTCCCCGAAAAGTGCCACCTG
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Staple Oligonucleotide Sequences for the Circle Origami:

Name	Sequence	Length
MiniM13-Circle-0[148]	GCGCGTAATCTGCTGCTTGCATCAAAGGA	29
MiniM13-Circle-1[102]	GGTTTGTTAGGTAAC TGGCTTCAGTGTAGCC	32
MiniM13-Circle-1[136]	TCTTCTTGGACCCCGTAGAAAAGACCAACTCT	32
MiniM13-Circle-2[119]	TTTTCCGAGCCGGATCAAGAGCTAAACAAAAAACCACCGCTACC	45
MiniM13-Circle-2[168]	GAGTTTTCGTCATGACCAAAATCCCACTCATAT	33
MiniM13-Circle-3[104]	GTAGTTATACATACCTCGCTCTTACCGGAT	30
MiniM13-Circle-3[136]	GGTGAAGATCATTTTTAATTTAAACTCTGTA	32
MiniM13-Circle-3[152]	GATAATCTTCCACTGAGCGTCAAGATCCTTT	31
MiniM13-Circle-4[119]	GCACCGCCGGCCACCACTTCAAGAAGGATCTA	32
MiniM13-Circle-4[167]	ATACTTTACAGATCGCTGAGATAGGGGCCAGA	32
MiniM13-Circle-4[189]	GTCAGACCAAGTTT	14
MiniM13-Circle-4[79]	GTGGCTGCTGCCAG	14
MiniM13-Circle-4[87]	TGTTACCAAAATACTGTTCTTCTAGCAGAGCGC	33
MiniM13-Circle-5[104]	AAGGCGCCAGCCAGCTTGGAGGCAGGGTC	30
MiniM13-Circle-5[136]	CAACTATGTTATCTACACGACGGGGGGGGTT	32
MiniM13-Circle-5[152]	AAATAGAGATTGATTAAAACTTCCTTTTT	30
MiniM13-Circle-5[62]	TCGTGTCTTACCGGGTTGAAGTACCTACAAGGGAGAA	42
MiniM13-Circle-6[119]	CGTGCACAAGCGGTCCGGCTGAACGAGTCAGG	32
MiniM13-Circle-6[167]	TGGTAAGCCGGCCCTTCCGGCTGGAAGTACTT	32
MiniM13-Circle-6[201]	GGTCTCGCGGAAATCTGGAGCC	22
MiniM13-Circle-6[87]	CTACACCGGACTCAAGACGATAGTGCTAATCC	32
MiniM13-Circle-7[104]	GGAACAGGCCTGGTATCTTTATTTTTTACG	30
MiniM13-Circle-7[136]	AGTTGCAGAATAGACTGGATGGAGGCTTCCAG	32
MiniM13-Circle-7[152]	CTGCGCTCCTCCCGTATCGTAGGATGAACG	30
MiniM13-Circle-7[184]	TTGCTGATTATCATTGCAGCACTGGTGCCTCACTGATTAAGC	42
MiniM13-Circle-7[52]	CACGCTTCCCAGCGTGAGCTA	22
MiniM13-Circle-7[72]	AGGCGGACGCCACCTCTGACTTGAGGAGCCTA	32
MiniM13-Circle-8[119]	GGGGAACGAGAGCGCAGAGGGAGCGGATAA	32
MiniM13-Circle-8[167]	ACTCTAGCTGAAGCCATACCAAACACCGAAGG	32
MiniM13-Circle-8[205]	CAACAACGTTGCGCCGATGCCT	22
MiniM13-Circle-8[87]	CGGGTTTCAGGTATCCGGTAAGCGGAACGAC	32
MiniM13-Circle-9[104]	GTTCTGTCTGCGTTATCCCCCGCAGCCT	30
MiniM13-Circle-9[136]	GATCGTTGATGGGGGATCATGTAATTGCTCAC	32
MiniM13-Circle-9[152]	AGCTGAATTCCCGGCAACAATTGACCACTT	30
MiniM13-Circle-9[184]	TGACACCAAACTATTAAGTGGCGCTGGTTTA	32
MiniM13-Circle-9[200]	GTAGCAATTTTTCGGCCAACTTACTTCCATGAGTGATAACA	42
MiniM13-Circle-9[56]	AGGGGGGCGCGTCGATTTTTGT	22
MiniM13-Circle-9[72]	TGGAAAAACGTATTACCGCCTTTGAGGCCCGC	32
MiniM13-Circle-10[119]	ATGTTCTTGCCTTTTGTGCTGGCCTTCTCGCCTT	32
MiniM13-Circle-10[167]	AGCTAACCACAGTAAGAGAATTATGGTCGCCG	32
MiniM13-Circle-10[87]	TGGATAACCGCCAGCAACGCGGCCAGTCCTGT	32

MiniM13-Circle-11[104]	GAATGGCAAATTCGCGTTAAATCCAGTTTG	30
MiniM13-Circle-11[136]	AAAAGCATTGGTTGAGTACTACCCGTTAATA	32
MiniM13-Circle-11[152]	TGGCATGGCTTTTTGACAAACGGAACCGG	30
MiniM13-Circle-11[184]	GCCATAACTGACAACGATCGGAGGGACGAGCG	32
MiniM13-Circle-11[50]	GAGTAATAGCGAAGAGTGAGCTGATACCGCTTTTGTCTGTC	42
MiniM13-Circle-11[72]	ACCGATCGCATTTTTTAACCAATAAAGAATAG	32
MiniM13-Circle-12[119]	TTTTGTTAGAATGGAAATTGTAAGAGTCACAG	32
MiniM13-Circle-12[167]	CATACACTGTTTCCAATGATGAGAGTTGGGT	32
MiniM13-Circle-12[203]	CCGTATTGACGCCTATGTGGCG	22
MiniM13-Circle-12[87]	AATCAGCTCCCTTCCCAACAGTTGTGATTCTG	32
MiniM13-Circle-13[104]	GAACAAGCAAAGGGCGAAAAACCACTAAAT	30
MiniM13-Circle-13[135]	TTGAGAGTTGGATCTCAACAGCGGTACGTGGAC	33
MiniM13-Circle-13[152]	GAAGAACATTCTCAGAATGACTCTTACGGA	30
MiniM13-Circle-13[184]	AAGTTCTGCGGGCAAGAGCAACTCGCAGTGCT	32
MiniM13-Circle-13[54]	TATAAATCAAGGCCGAAATCGG	22
MiniM13-Circle-13[72]	ACCGAGATGGCCCACTACGTGAACCA	26
MiniM13-Circle-14[119]	TCCAACGTAGTCCACTATTAAGAAAGATCC	31
MiniM13-Circle-14[167]	GCACGAGTGCCTTCTGTTTTTTGTCAATAATATTGAAATAACCCCTGA	49
MiniM13-Circle-14[193]	TAAAAGATGCTGAAGATCCACTTTTA	26
MiniM13-Circle-14[87]	AGGGCGATAGGGTTGAGTGTGTTTTTGTTA	32
MiniM13-Circle-15[104]	CGGAACCGGAAAGCCGGCGAACAGCGGGCGCTAGGGCCCACCACAC	46
MiniM13-Circle-15[136]	TATTCCTTATTCAACATTTCCGTATTAGAG	32
MiniM13-Circle-15[152]	GCATTTTGGGTTACATCGAACTTTCGCCCC	30
MiniM13-Circle-15[176]	CTCACCCAGAAACG	14
MiniM13-Circle-15[66]	CAAGTTTTTTGGGG	14
MiniM13-Circle-16[119]	CTTGACGGCTAAAGGGAGCCCCCGGTCGCCCT	32
MiniM13-Circle-17[136]	ATATGTATGTTATTTTCTAAATGCACTTTTCGGGGAAATGTGC	45
MiniM13-Circle-17[87]	AGCGAAAGGGTGGCGAGAAAGGAAGTCGAGGTGCCGTAAAGCGTCTATC	49
MiniM13-Circle-18[119]	GCGCGTAAGCTGGCAAGTGTAGCGACATTCAA	32
MiniM13-Circle-18[153]	CCCCTATTCCGCTCATGAGACAAAAGGAAGAGTATGAGTTTTTGCG	47
MiniM13-Circle-19[107]	CGCTTAAAGCGCCGCTACAGGGTCACGCT	29

Staple Oligonucleotide Sequences for the Triangle Origami:

Name	Sequence	Length
Triangle3_1[224]	TTTCTGCGAAAGGATCTTCTTGAGGACAGTAA	32
Triangle3_0[207]	GAGAATTAATCTTACGGATGGCATATCCTTTT	32
Triangle3_0[242]	AGAAAAGATCCGTAATCTGC	20
Triangle3_3[179]	GAGTGATAAACTGCGGCCAGAGCTAACCGCTTTAATGAAG	42
Triangle3_3[224]	TAACGTGAGATAATCTCATGACCAGATCGGAG	32
Triangle3_2[207]	GACCGAAGACTTACTTCTGACAACAAATCCCT	32
Triangle3_2[255]	GGATCTAGTCATATATACTTTAGAAATGGATGA	32
Triangle3_5[157]	CGCCTTGATCGGGCGAACTACTTACTCGAGGCGGA	35
Triangle3_5[192]	CCATACCAAATGGCAACAACGTTCTCGGCCCTTCCGGC	38
Triangle3_5[224]	GGTAACTGTAGGTGCCTCACTGATCCACGATG	32
Triangle3_5[240]	AAGTTTACGTGAAGATCCTTTTTGTTCGTTCCACTGAGCGT	43
Triangle3_4[175]	TATTAACTTTGGGAACCGGAGCTGTTGCACAACATGGGGG	40
Triangle3_4[207]	CCTGTAGCAACGACGAGCGTGACATAAGCATT	32
Triangle3_4[255]	ACGAAATAGCGGTATCATTGCAGCACTGGGGC	32
Triangle3_4[287]	TACACGACAAGCCCTCCCGTATCG	24
Triangle3_7[160]	TAAAGTTGCAGGACCACTTCTGCGGCGCAAAC	32
Triangle3_7[200]	TGGCTGGTTTATTGCTGATAAATCTGGAGCCG	32
Triangle3_7[232]	GTGAGCGTGGGTCTCGACAGATCGCTGAGATCAGACC	37
Triangle3_7[272]	CAGATGGTGGGGAGTCAGGCAACTTGATTTAAAA	35
Triangle2_13[224]	AGCCTGAAGATCGCCCTTCCCAACGTTTGTTT	32
Triangle2_12[207]	GCCGGATCACCGCTACCAGCGGTGAGTTGCGC	32
Triangle2_12[242]	GGCCCGCACCTGGCGAATGG	20
Triangle2_15[179]	CCGAAGGTAAC TGCTTCAGTGTAGCCGTAGTTAGTGTTACC	42
Triangle2_15[224]	CTTTGAGTTTCTGTGGATAACCGTAATACTGT	32
Triangle2_14[207]	TCTTCTAGCAGAGCGCAGATACCAATTACCGC	32
Triangle2_14[255]	TTCTTTCCGGCCTTTTACGGTTCTCGCCACC	32
Triangle2_17[157]	CGCCTACATACCGCAGCGGTGCGGCTGAGCGAACG	35
Triangle2_17[192]	AGTGGCTGTGGACTCAAGACGACAGCGTGAGCTATGA	38
Triangle2_17[224]	CTATGGAATGATGCTCGTCAGGGGTCGTGTC	32
Triangle2_17[240]	AGCAACGCTGCGTTATCCCTGAGAGCTGATACCGCTCGAGTA	43
Triangle2_16[175]	GGATAAGGCTCGCTCTGCTAATCCGCCACCACTTCAAGAA	40
Triangle2_16[207]	TTACCGGGCTGCCAGTGGCGATAAGGCGGAGC	32
Triangle2_16[255]	TCTGACTTAGCGGCAGGGTCGGAACAGGAGAG	32
Triangle2_16[287]	GTATCTTTGGAGCTTCCAGGGGGA	24
Triangle2_19[160]	ACCTACACCGAACTGAGATACCTATAGTTACC	32
Triangle2_19[200]	GAAGCGCCACGCTTCCCGAAGGGAGAAAGGCG	32
Triangle2_19[232]	GACAGGTATCCGGTAGAGCGTCGATTTTTGAAACGCC	37
Triangle2_19[272]	CGCACGAGATAGTCTGTGCGGTTCTGGCCTTTTG	35
Triangle1_25[224]	GAATGACTCGGTGCGCGCATACACTAAATTTT	32
Triangle1_22[207]	TGTTAAATTTGTAAAAATTCGCGTTATTCTCA	32
Triangle1_22[242]	AAGAGCAACTGGTTGAGTA	20

Triangle1_27[179]	AGGCCGAAATCGGCAAAATCGTTGAGTGTTGTTCCAAAAACC	42
Triangle1_27[224]	GCTATGTGAATGATGAGCACTTTTAATAGACC	32
Triangle1_24[207]	GAGATAGGCCTTATAAATCAAAAGAAAGTTCT	32
Triangle1_24[255]	TTTCGCCCGGGTTACATCGAACTGTTTGCCT	32
Triangle1_29[157]	GAACGTGGACTAGCACTAAATCGGAACGGGAAAGC	35
Triangle1_29[192]	GTCTATCAAATCAAGTTTTTTGGGGAAGAAAGCGAAAG	38
Triangle1_29[224]	GAAGATCAACGCTGGTGAAAGTAACGTGAACC	32
Triangle1_29[240]	GCACGAGTCGAAGAACGTTTTCCGCGCGGTATTATCCCGTATT	43
Triangle1_26[175]	TGCCGTAACCAACGTCAAAGGGCGAGTTTGGAAACAAGAGT	40
Triangle1_26[207]	ATCACCTTGGGCGATGGCCCACTAAAGATGCT	32
Triangle1_26[255]	TCCTGTTTAAATGCTTCAATAATATTGAAAAA	32
Triangle1_26[287]	GCCCTTATATGAGTATTCAACATT	24
Triangle1_31[160]	CGGCGAACGTGGCGAGAAAGGAAGGGTCGAGG	32
Triangle1_31[200]	GAGCGGGCGCTAGGGCATGTATCCGCTCATGA	32
Triangle1_31[232]	GACAATAACCGTGATTTTGCTCACCCAGAAGTTGGGT	37
Triangle1_31[272]	GGAAGAGTTCCTTTTTTGCGGCAGATCTCAACAG	35
Triangle3&1_1[189]	ACAGAAAAGCTGCAGTGCTGCCATAACCATTTTGACGCCGGGC	44
Triangle3&1_2[167]	ATCATGTAACTTTTTCGGTAAGATCCTTGAGAGT	34
Triangle3&1_7[136]	ATTAATAGACTGGATGTAGCTTCCCGCAACATTTTCCGTGTC	44
Triangle2&3_13[189]	CAAAAAAACCAAGAGCTACCAACTTTTTTTTTCAGACCCCGT	44
Triangle2&3_14[167]	CTCTGTAGCACTTTTCTTCATTTTAATTTAAAA	34
Triangle2&3_19[136]	ACACAGCCCAGCTTGGAACGGGGGTTTCGTGCTTTTAGTTATC	44
Triangle1&_25[189]	CGTTAATATTCAGCTCATTTTTTAACCAATTTTATAGCGAAGA	44
Triangle1&2_24[167]	CCACTATTAAATTTTCTGGCCTTTTGCTCACATG	34
Triangle1&2_31[136]	GATTTAGAGCTTGACGCCTAAAGGGAGCCCCCTTTTAACGCCTG	44

Staple Oligonucleotide Sequences for the Spike Origami:

Name	Sequence	Notes
MiniM13-6HelixSpike-0[135]	TAACTGGCCACCACGACTTTTTTGCACAACAT	32
MiniM13-6HelixSpike-0[167]	CAGTCACAGAAAACAACGTTGCGAGCGCCA	30
MiniM13-6HelixSpike-0[207]	GCATACACTATTCTCAGTGCTGCCATAGGCCTTTTGCT	38
MiniM13-6HelixSpike-0[239]	TATTGACGCCGGGCAAGCTCACATGTTCTTCTCGCTTA	40
MiniM13-6HelixSpike-0[263]	GCTATGTGTTCTGTGGTTCCCAACAGTTGCGC	32
MiniM13-6HelixSpike-0[303]	CGAAGAACGTTTTCCATGAGCTGATACCGCTTCAATAATA	40
MiniM13-6HelixSpike-0[359]	TGGGTTACCGCCCTTAATTTTTCTAAATACAT	32
MiniM13-6HelixSpike-0[39]	TTTAAAACCTTAACGACAAAAAACACCGCT	33
MiniM13-6HelixSpike-0[391]	AAAAGATGTTCTGTTCGGGAAATGTGCGCG	32
MiniM13-6HelixSpike-0[71]	GACCAAGTAGACCCCGCTTTTTTCTGCGCGT	32
MiniM13-6HelixSpike-0[87]	CATTGGTACAGCCAGCTTGAGCGAACGACGAAATAG	38
MiniM13-6HelixSpike-1[112]	CAAACGACGAGCGTGAGAACTACTGGATGGAGGGGAGTCAGGCAACTA	48
MiniM13-6HelixSpike-1[144]	GCAATGGCAAGCATCTTACGGATACAACGAT	31
MiniM13-6HelixSpike-1[16]	CTCATGACCAAAATCTTCATTTTCCGAAGGTTACCAGT	39
MiniM13-6HelixSpike-1[176]	AGTAAGAGAATTATGCAGAATGACTTGCTGATGGTATCAT	40
MiniM13-6HelixSpike-1[216]	GGCCTTTTGAGCAACTGGCGGAGCGATTTTTG	32
MiniM13-6HelixSpike-1[248]	TCCCCTGAGCGCGGTAAGCGTTAATATTTTGT	32
MiniM13-6HelixSpike-1[280]	CCTTTGAGATGATGAGATTTTGTAAATCGGCAAAATCCCT	40
MiniM13-6HelixSpike-1[312]	TTGAAAAATTGAGAGTAAGGAGCGCGAGAAAAG	32
MiniM13-6HelixSpike-1[344]	TTCCGTGTATCGAACTAGCGGTCAAGAGCTTGACGGGGAA	40
MiniM13-6HelixSpike-1[368]	TTTGCGGCATTTTGCCCTGAAGATCCGCGCTTTAAATCGG	40
MiniM13-6HelixSpike-1[48]	CGTTCCTACTGAGCGTCTTACTCATTACCAATCACCGCCTACAT	44
MiniM13-6HelixSpike-2[119]	GGGGGATCAATAGACTTACTCTAGGAAGTACCTAC	40
MiniM13-6HelixSpike-2[159]	CGGAGGACCGAAGGAGACCACTTCTGCGCTGCCCTCCC	38
MiniM13-6HelixSpike-2[183]	GGCCAACCTCTGGTTTATTGGTTGAACAGGTATCCGGTAAG	40
MiniM13-6HelixSpike-2[215]	TTACGGTTCCTACCATGAGTGATAAACTGC	31
MiniM13-6HelixSpike-2[22]	ACCAGCCTCTTTTAAATTTAGGACTCAAGACGATAG	36
MiniM13-6HelixSpike-2[247]	AGCCTGAATGGCGCGCCAGCAACGCGCCTTT	32
MiniM13-6HelixSpike-2[279]	CCGCACCGCGCGTTAACTTTTAATAGGGTTGAGTGTTG	40
MiniM13-6HelixSpike-2[318]	CAATAACCTGATAAATGCTCGAGTAATAGCGAAGAGGC	39
MiniM13-6HelixSpike-2[343]	TCAAATATGCAAGTGTGGATCTCAGTCAAAGGGCGAAAAA	40
MiniM13-6HelixSpike-2[375]	GAACCCCTCACACCCGCAGTTGGGTGGCCAC	32
MiniM13-6HelixSpike-2[55]	AATCTGCTAGCGCAGAATATACTTCAGCGGTCGGGCTGAA	40
MiniM13-6HelixSpike-2[75]	GATCTAGAAAAGATCAAAGAACCGGAGTGATTAAG	35
MiniM13-6HelixSpike-2[95]	TCGTTGGGGATCTTCAGCCGTAGTTTCGCTG	31
MiniM13-6HelixSpike-3[168]	CCGGCTGGTACTTCTGGGCATGAC	24
MiniM13-6HelixSpike-3[264]	TAAAATTATCGCCATAACCGTATTACCG	29
MiniM13-6HelixSpike-3[328]	GGCGCTGGTATCCGATGAGTATTCAACAT	29
MiniM13-6HelixSpike-3[9]	CTACCAAGGTGGTTTTTGATAAT	23
MiniM13-6HelixSpike-3[97]	AGATAGGCAACAATTATGTAACTCGCCTTGA	31
MiniM13-6HelixSpike-4[111]	TGGATGAACCTACACCCTTCCCGGTGCCTCACCTGAATGAAGCCATAC	48

MiniM13-6HelixSpike-4[151]	GTATCGTAGTTATCTCTATGAGACAAACTAT	31
MiniM13-6HelixSpike-4[183]	TGCAGCACTGGGGCCAAAAGGCGGGTACTCAC	32
MiniM13-6HelixSpike-4[215]	TGATGCTCGAGCGTGTCTGGAACAGGAGAGCGCACGAGG	38
MiniM13-6HelixSpike-4[23]	GGCTGCTGCCAGTGGACCGGGTTAAAGGATC	31
MiniM13-6HelixSpike-4[239]	CTCTGACTAGGGGGAAACGCCTGGTATCTTTA	32
MiniM13-6HelixSpike-4[271]	TATAAATCAAAATCCTGTCTGGGTTTCGCCAC	31
MiniM13-6HelixSpike-4[311]	GAAGGGAATTAACCAATGGAACAAGAGTCCAC	32
MiniM13-6HelixSpike-4[335]	AGCCGGCCTCCAACACAGCGGTAAGATCCGGAAGAGTCTCATGAGA	46
MiniM13-6HelixSpike-4[375]	AACCCTAAAGGGAGCCCAGGGCGATGCACGAG	32
MiniM13-6HelixSpike-4[51]	ACCTCGCTCTGCATAAGGCGTAGATTGA	28
MiniM13-6HelixSpike-4[95]	ACAGAAGGCCACCACTTCAAGAATCGTGCACAACGTCA	39
MiniM13-6HelixSpike-5[128]	AGCGTGAGACACGACGGCGGATAAAGTTGCAGGCTAACCGTGCCTGTA	48
MiniM13-6HelixSpike-5[152]	CGCTTCCCGAAGGGAGGATGGTAACGGCCCTT	32
MiniM13-6HelixSpike-5[192]	CGGCAGGGGGTCTCGCAAATCTGGAGCCGGTGTGTCAGGGGCGGTCGCC	47
MiniM13-6HelixSpike-5[224]	GAGCTTCCTGAGCGTCCTATGGAAAAAATGGAAATTGTATTATCCCG	48
MiniM13-6HelixSpike-5[256]	TAGGAATAGACCGAGAAGTTCT	22
MiniM13-6HelixSpike-5[288]	TTCCAGTTTAGGCCGATAAATCAGCTCATTGAAAGCGATTTTCGCCC	48
MiniM13-6HelixSpike-5[312]	TATTAAAGAACGTGGAGAACGTGGGGCGCTAG	32
MiniM13-6HelixSpike-5[33]	TTACCGGTAATCCTGTAACTGGCTTCAGCAGGCTTGCAATGAGTTTT	47
MiniM13-6HelixSpike-5[352]	CCGTCTATCCCGATTTCTGCTGCGCGTAACCACATTTGTTTTCCCTTT	48
MiniM13-6HelixSpike-5[376]	TACGTGAACCATCACCTAAAGCACAAAGCGCC	32
MiniM13-6HelixSpike-5[64]	CGGGGGGTCTCTGTAGACTGTTCTTCTAGTGTGTTGA	36