© 2021 Wiley-VCH GmbH

NANO MICRO small

Supporting Information

for *Small,* DOI: 10.1002/smll.202007704

Strategies for Constructing and Operating DNA Origami Linear Actuators

Erik Benson, Rafael Carrascosa Marzo, Jonathan Bath, and Andrew J. Turberfield**

Supporting Information

Strategies for Constructing and Operating DNA Origami Linear Actuators

Erik Benson‡, Rafael Carrascosa Marzo‡, Jonathan Bath, Andrew J. Turberfield**

Department of Physics, University of Oxford, Parks Road, Oxford OX1 3PU, UK.

* andrew.turberfield@physics.ox.ac.uk , erik.benson@physics.ox.ac.uk

Table of Contents

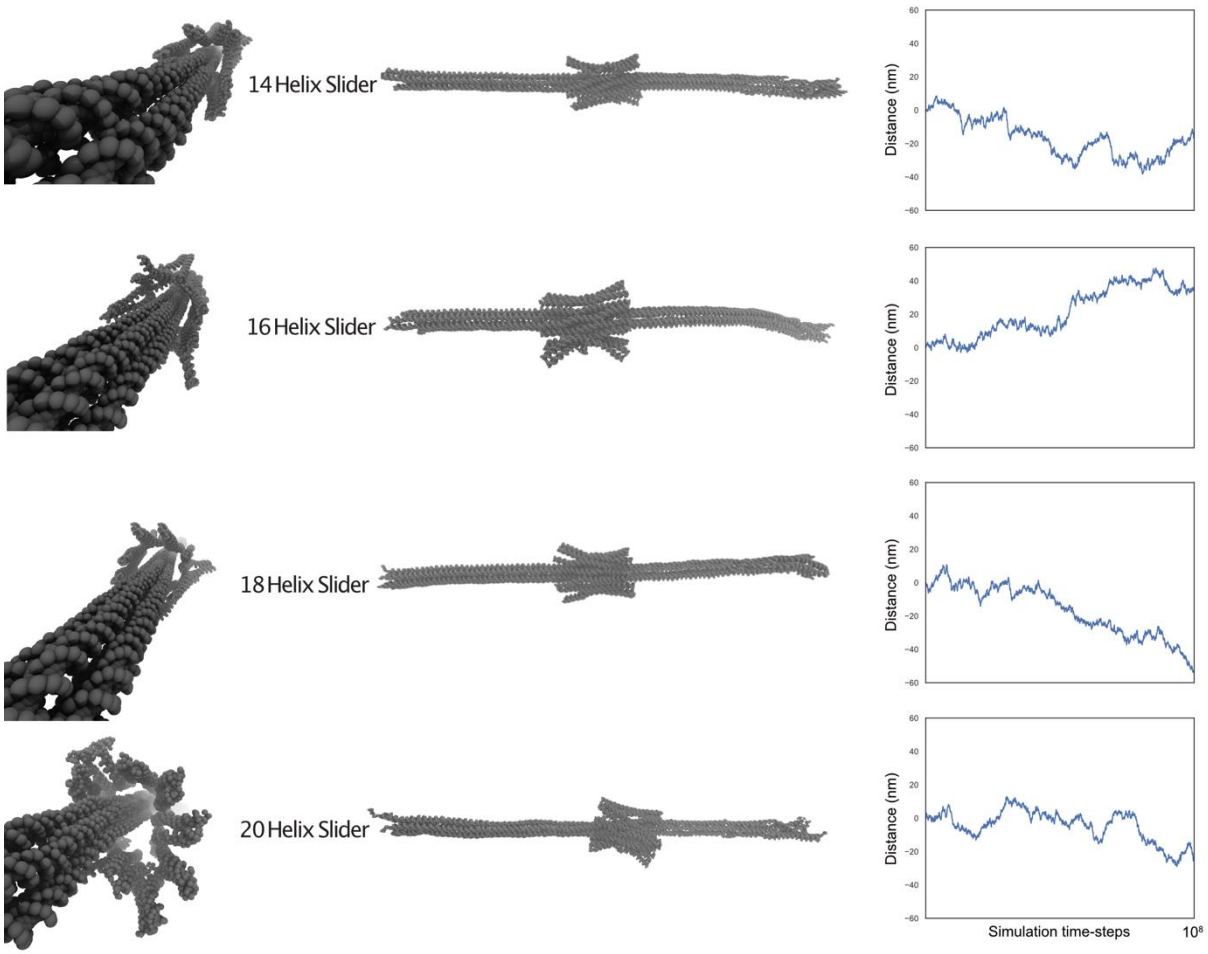

Figure S1. Simulation prototyping of slider size. A six-helix-bundle rail with a length of ~155 nm was designed to thread a freely-moving slider constructed from 14-20 parallel helices. The designs were simulated in oxDNA for 10^8 timesteps to study the mobility of the sliders on the rail. All sliders were found to be capable of diffusive motion along the rail. Left and centre: renderings of representative configurations from the simulations. Right: fluctuations in slider position during simulation (changes in the distance from the slider to one end of the rail are plotted).

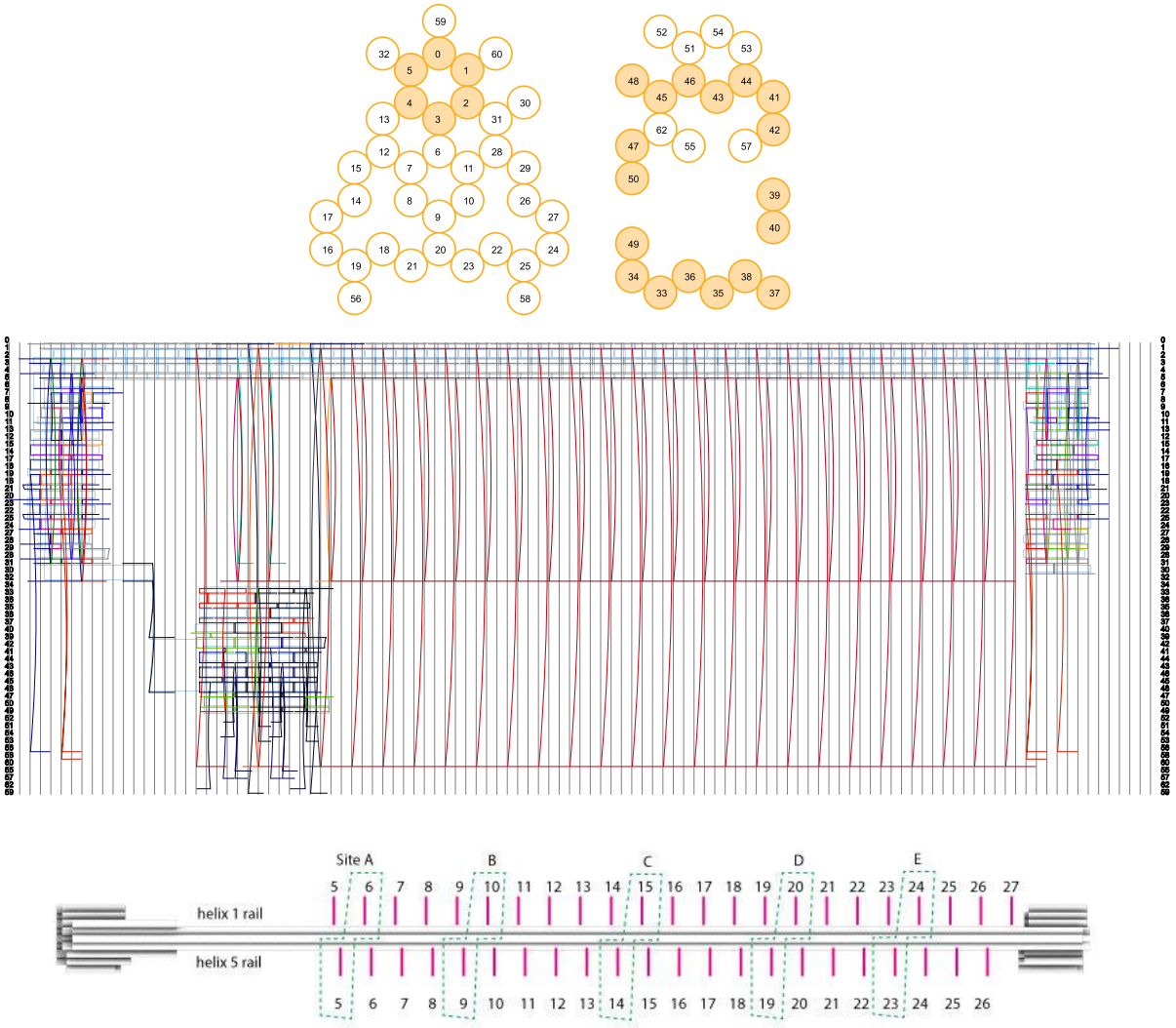

Figure S2. Design of one-pot device. Top and Centre: cadnano design schematic. Bottom: the rail of the one-pot design incorporates two tracks of address linkers, single-stranded staple extensions, along helices 1 and 5. In this work, five binding sites for the slider (labelled A-E) are used: each comprises a pair of address linker strands, one from each track.

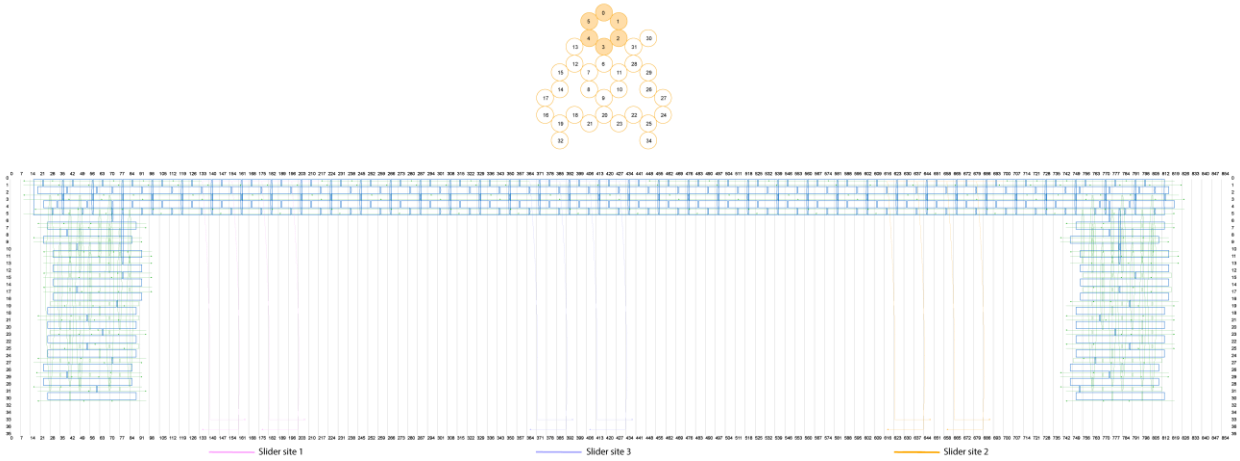

Figure S3. Design of two-pot rail. In the cross-section of the structure, the rail 6-helix bundle is in darker brown.

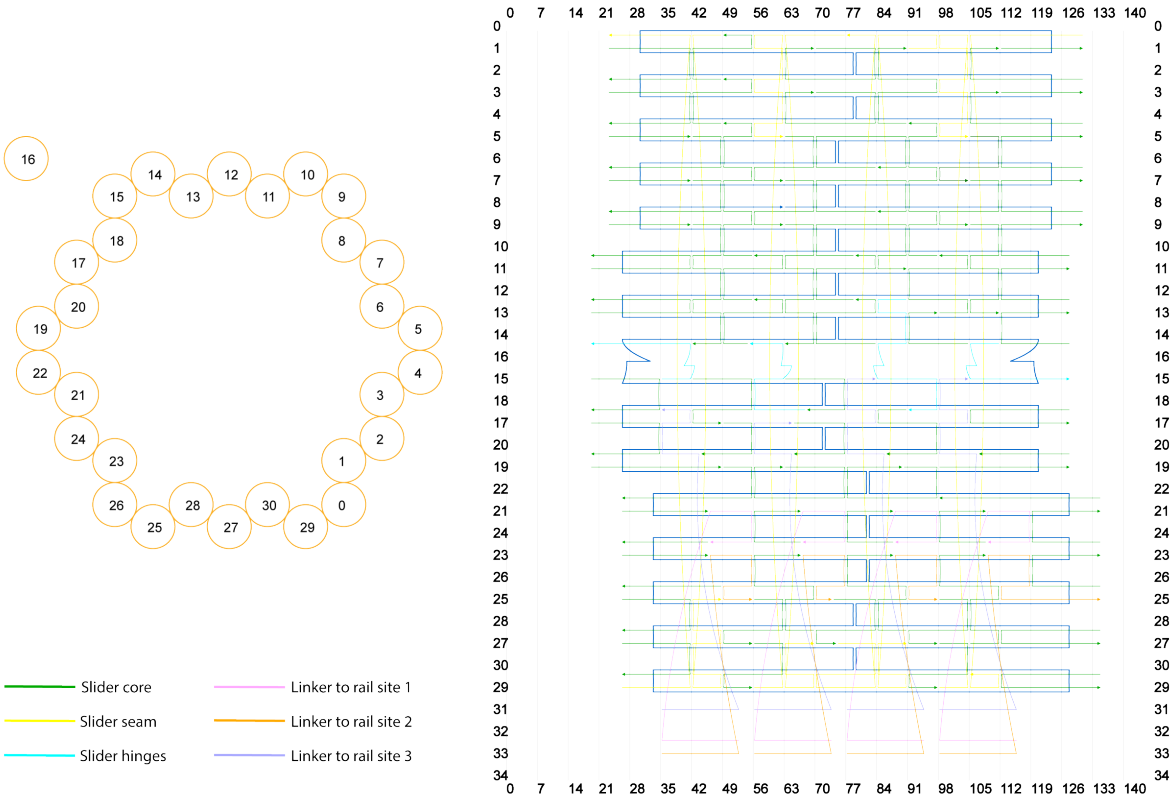

Figure S4. Design of two-pot slider. Seam staples for closing slider, hinge staples for increased flexibility, and linker staples for loading and positioning slider on rail are highlighted. The hinge staples have a TTT single-stranded region that, along with two single-stranded crossovers of the scaffold, provide the slider with the necessary flexibility to wrap around the rail when open.

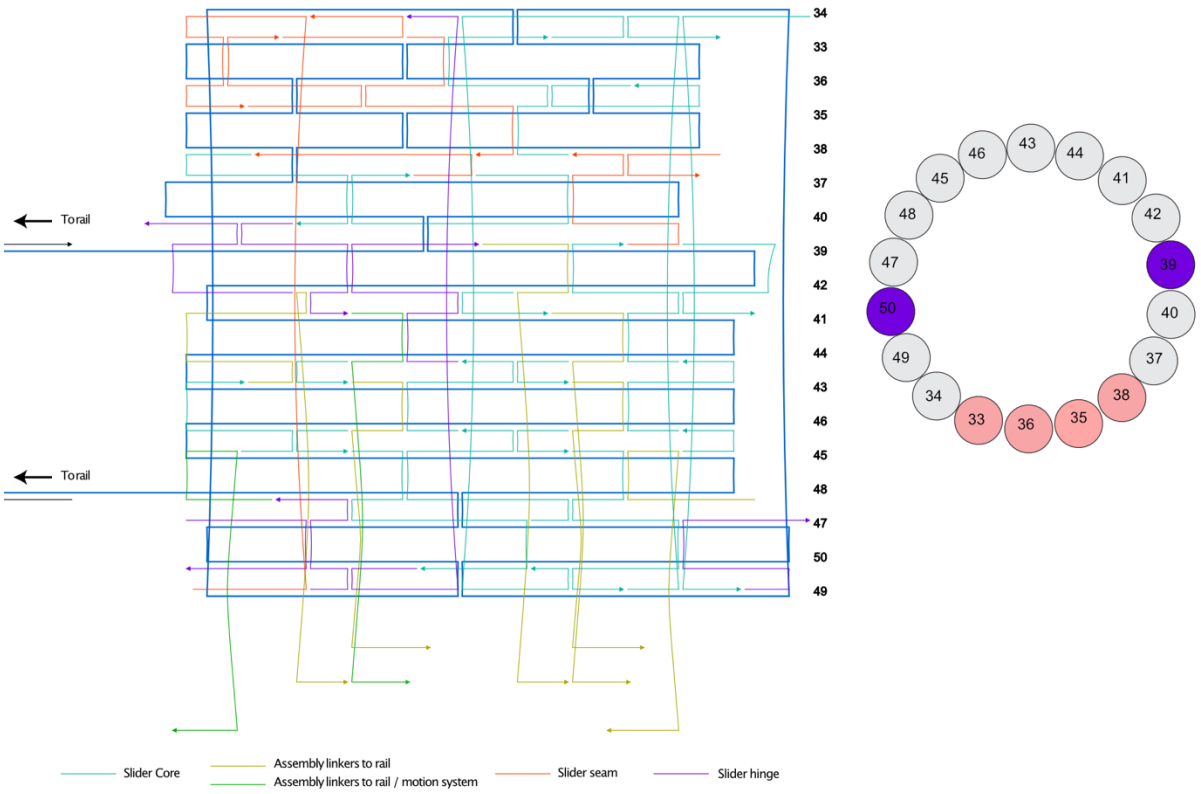

Figure S5. Design of one-pot slider. The eight assembly linkers (yellow and green) are extended staples that protrude inside the slider and are designed to hybridize with linkers protruding from the rail during assembly. After assembly, these links are broken by strand displacement, blocking the linkers on the rail and freeing the linkers inside the slider. Red seam staples are left out in folding and added afterwards to close the slider. Purple hinge staples are left out in folding to give more flexibility for the slider to close around the rail and are added after the seam staples. After assembly, the two green linkers are used in the positioning system: hybridization of bridge oligonucleotides connects them to “address” linkers on the rail.

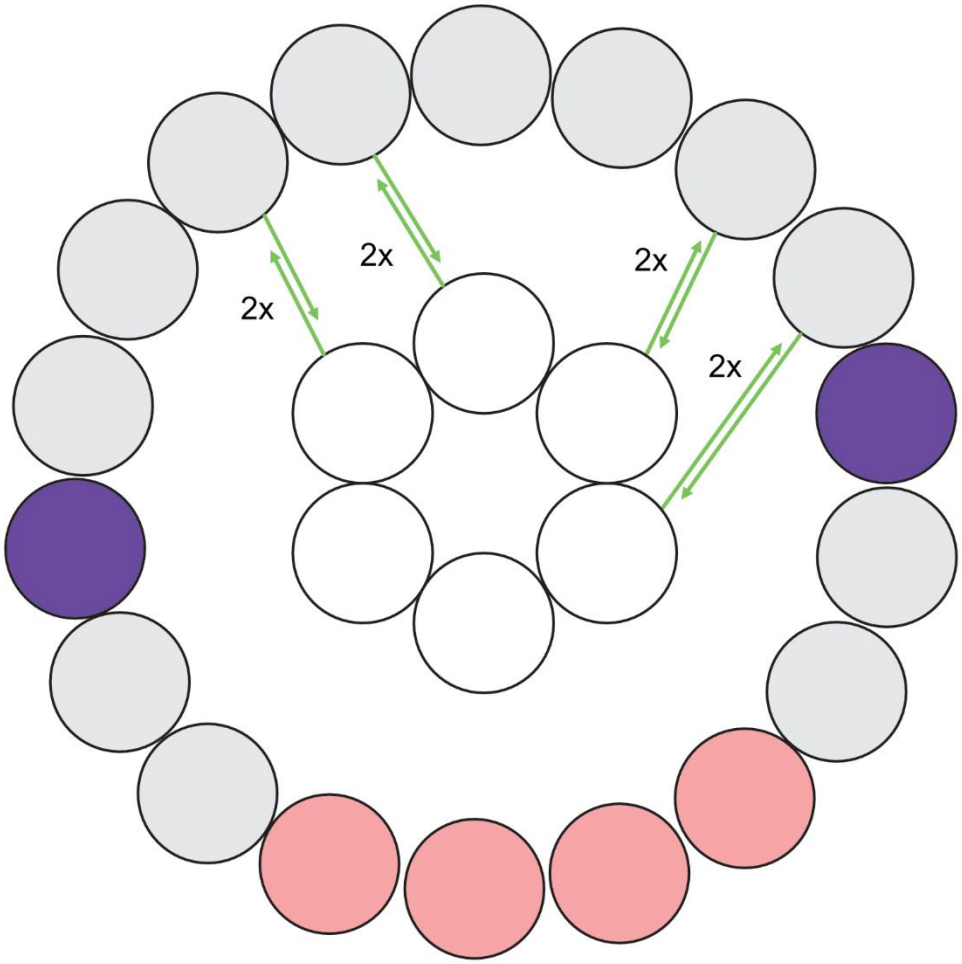

Figure S6. Side-view design schematic of one-pot device. Protruding staples from the inside of the slider (two staples each from four helices) hybridize with protruding staples from the top of the rail to guide the slider onto the rail. Staple strands in the hinge regions (purple helices) are left out during folding to increase the flexibility of the slider so the seam region (red helices) can close more easily. After folding, the missing seam region staples are first added to close the slider around the rail. After this, the hinge staples are added to close the hinge.

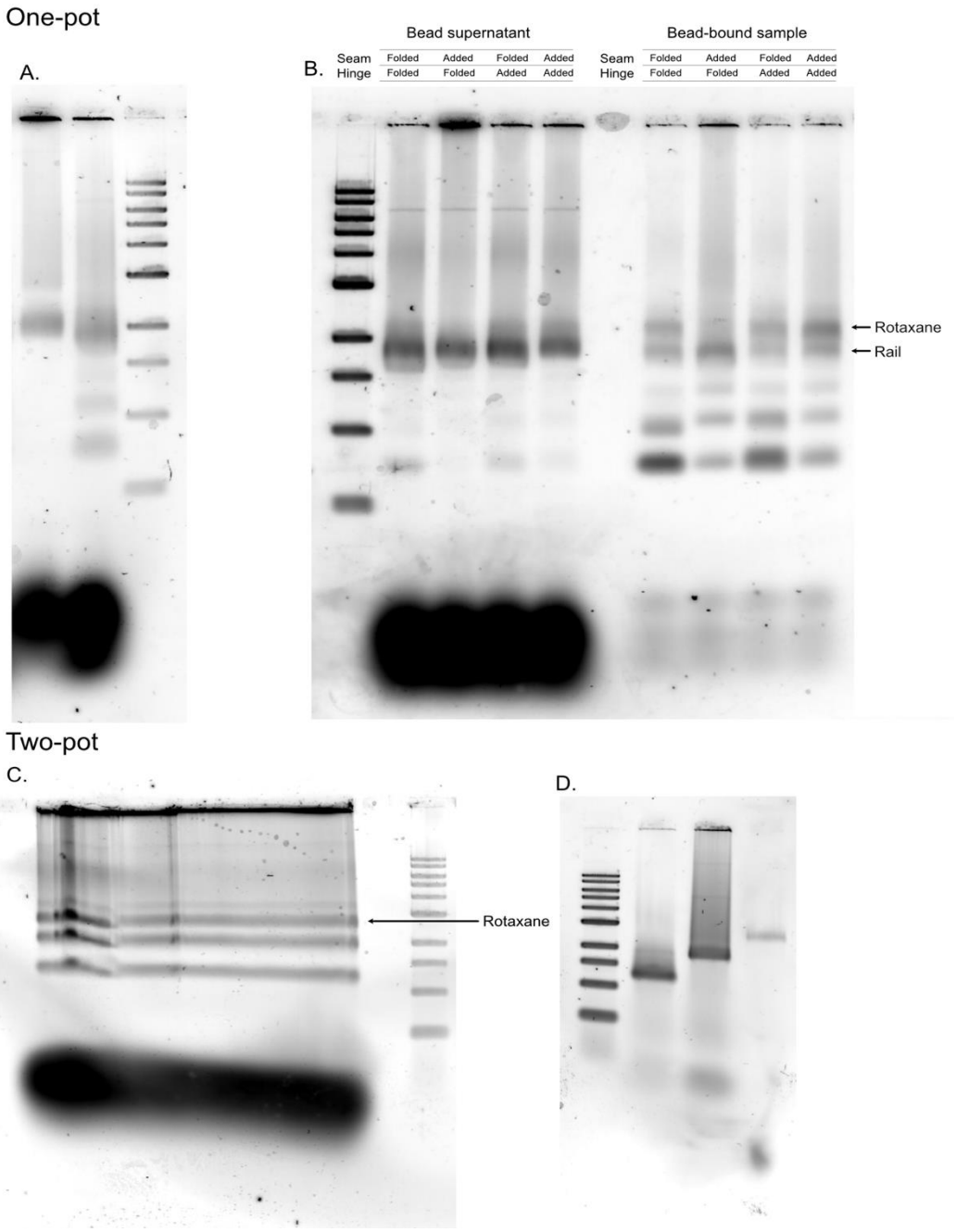

Figure S7. Analysis by agarose gel electrophoresis of one- and two-pot devices. A. One-pot device. From left: one-pot device after folding, one-pot device after digestion to release slider on rail, New England Biolabs 1 kb ladder. B. Effect of closing strategies and bead purification. For the one-pot device, the seam and hinge region staples can be incorporated in the folding mix (folded) or added after folding (added). The left half of gel shows the supernatant of the sample after addition of magnetic beads and the right half shows the samples that are bound to the beads and later released by strand invasion. The sample where both the hinge and seam staples are added after folding shows the highest yield of of rotaxane after bead purification. C. A 1:1 mixture of rail and slider incubated for 3 days and then closed and released, run in an agarose gel for gel extraction. D. Two-pot device after gel extraction. From left: 1kb ladder, slider, rail, gel-extracted slider-rail.

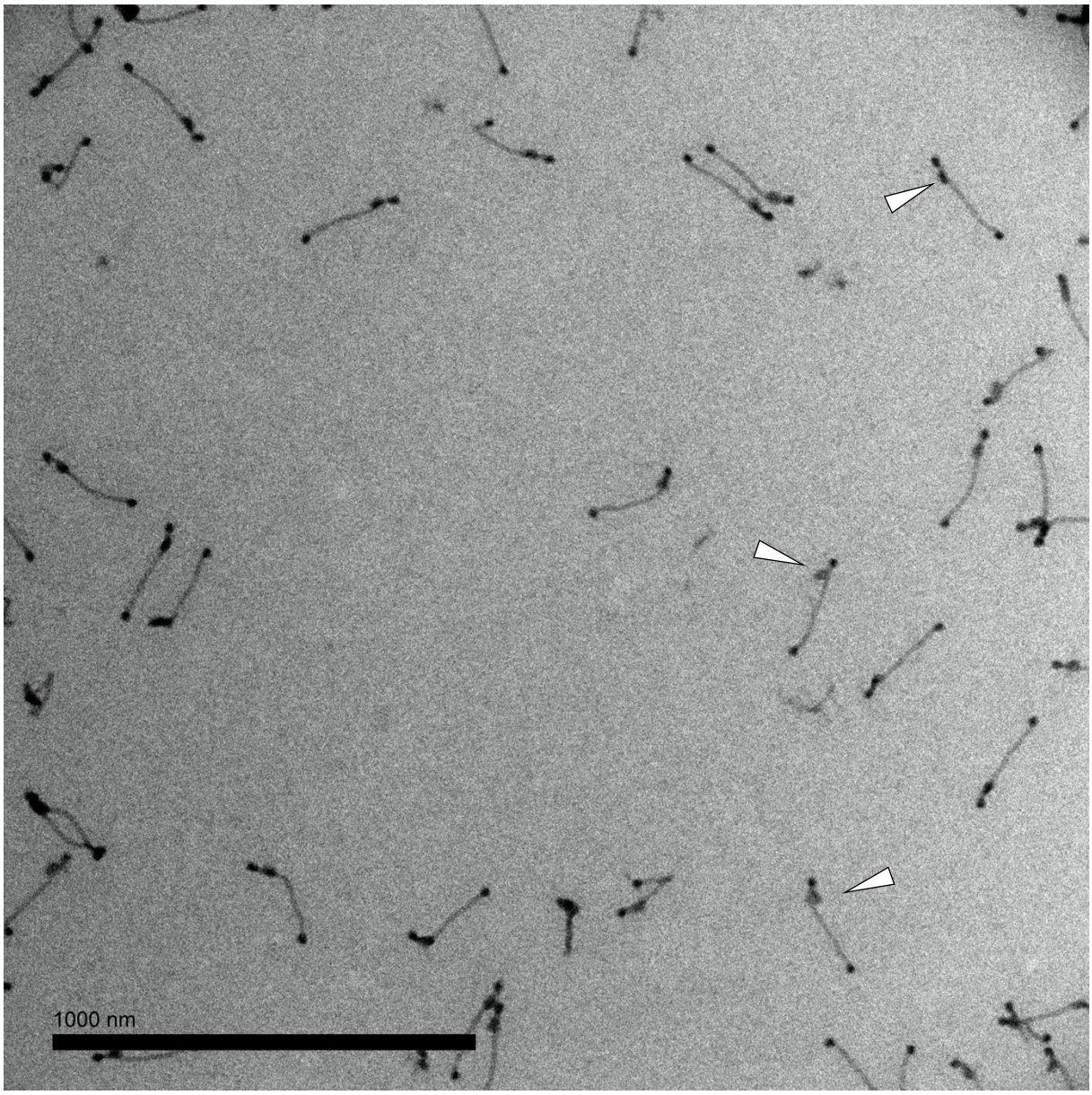

Figure S8. TEM overview image of one-pot device folded with seam staples. Arrows indicate examples of devices were the slider has closed outside the rail

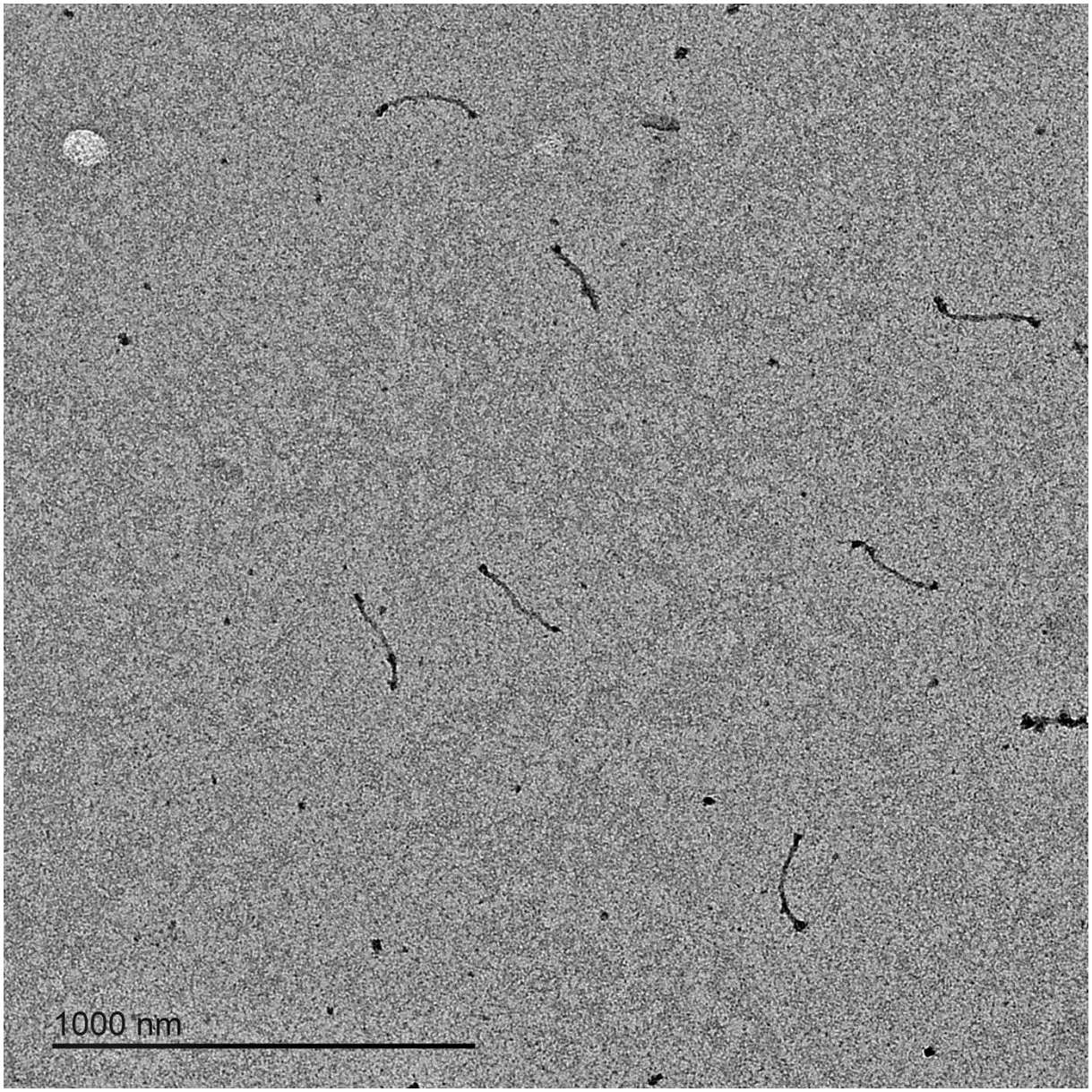

Figure S9. TEM overview of one-pot device before magnetic bead purification.

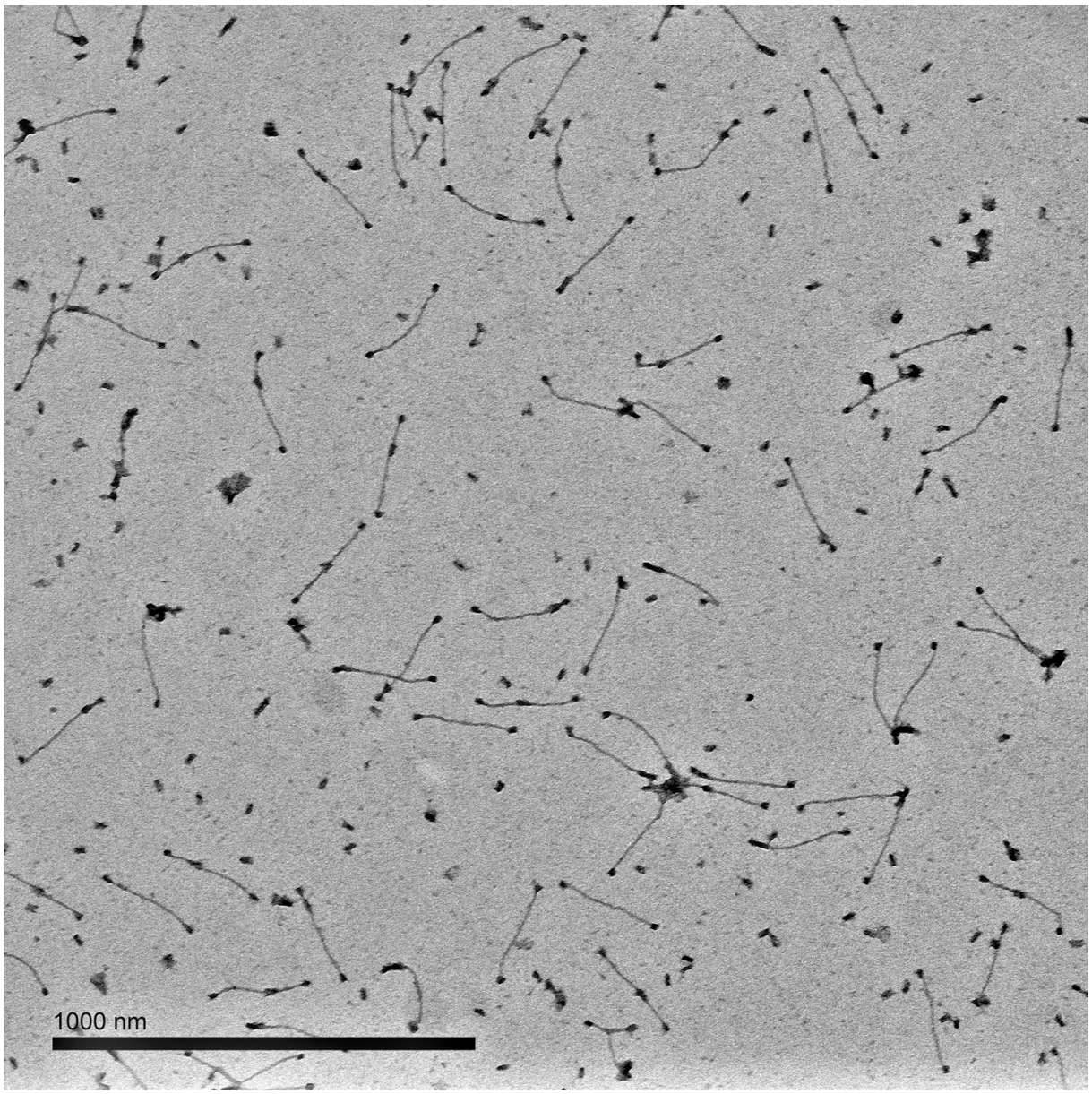

Figure S10. TEM overview of one-pot device after magnetic bead purification.

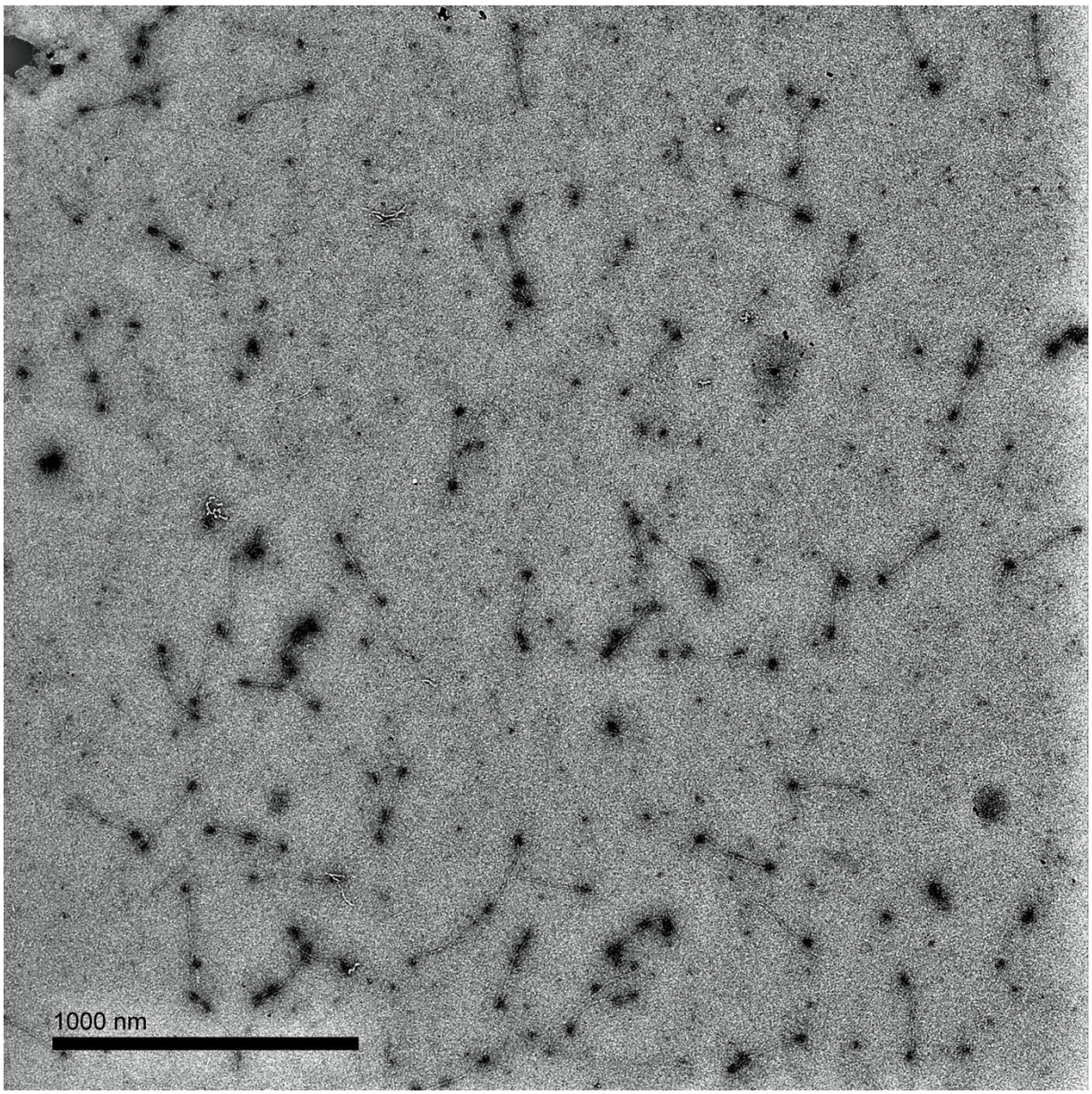

Figure S11. TEM overview of two-pot device not locked to any site.

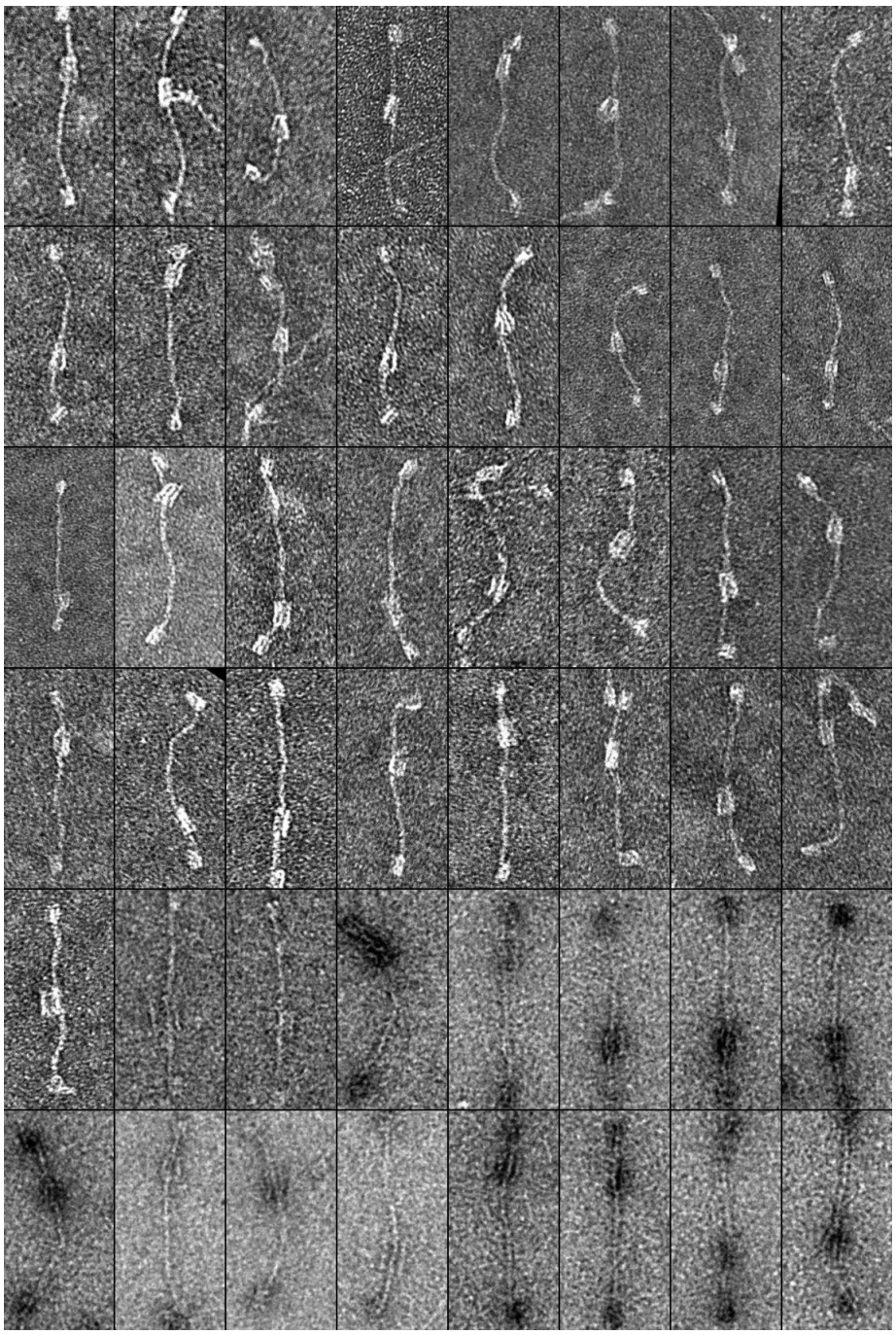

Figure S12. TEM image gallery of freely diffusing two-pot device. Images are cropped in 150 × 300 nm boxes.

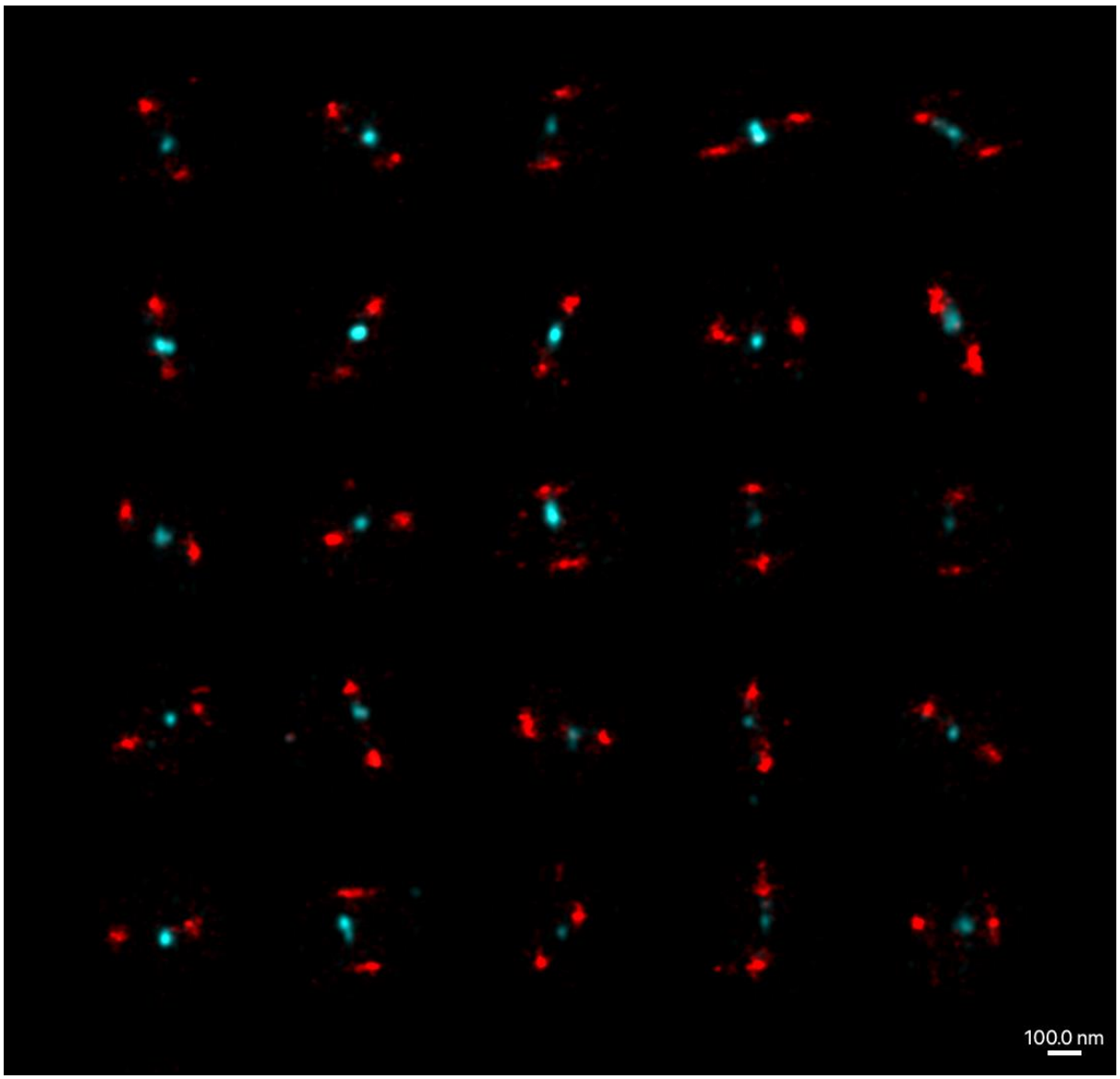

Figure S13. DNA-PAINT image gallery of one-pot devices with slider locked. Slider (blue) locked in the middle of the rail between the two stoppers (red)

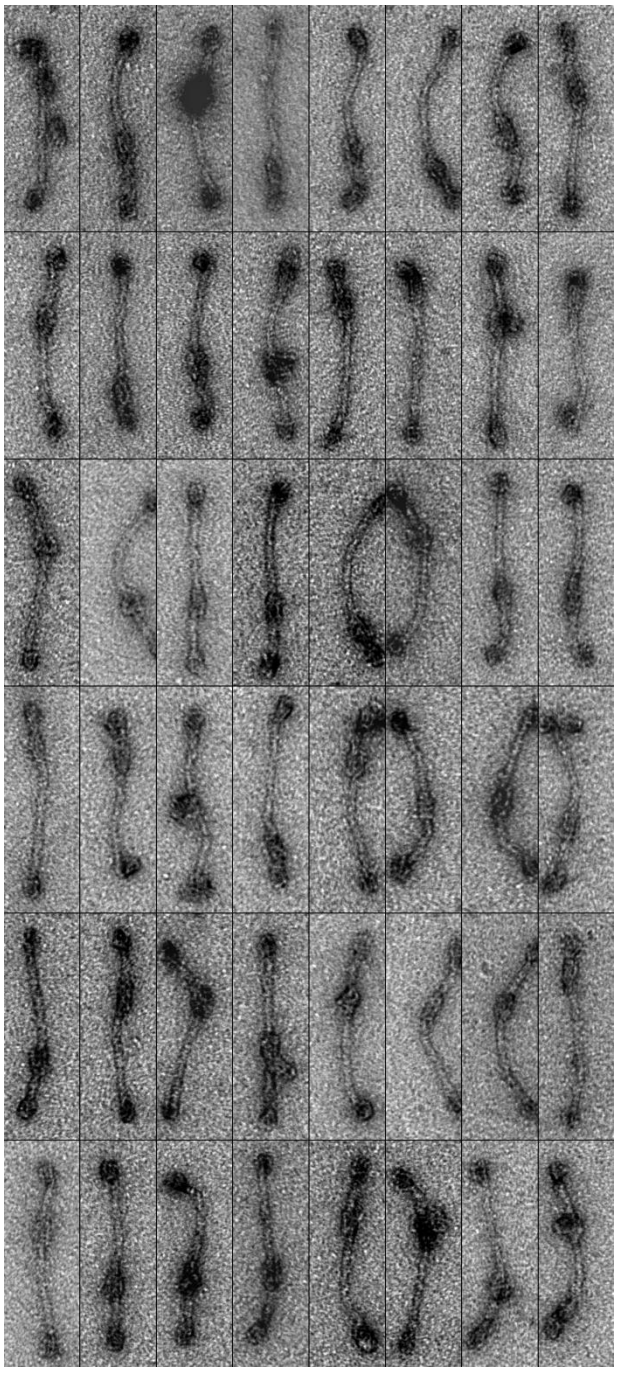

Figure S14. TEM image gallery of one-pot device locked to site A. Images are cropped in 100 × 300 nm boxes.

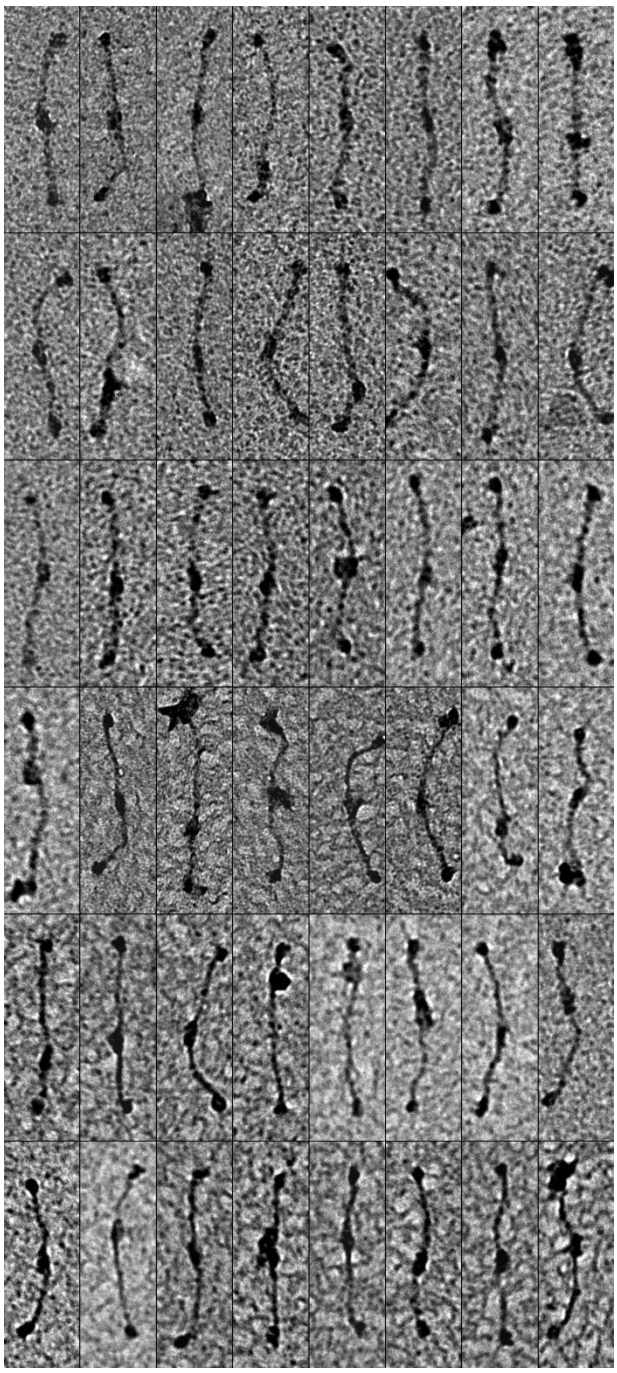

Figure S15. TEM image gallery of one-pot device locked to site B. Images are cropped in 100 × 300 nm boxes.

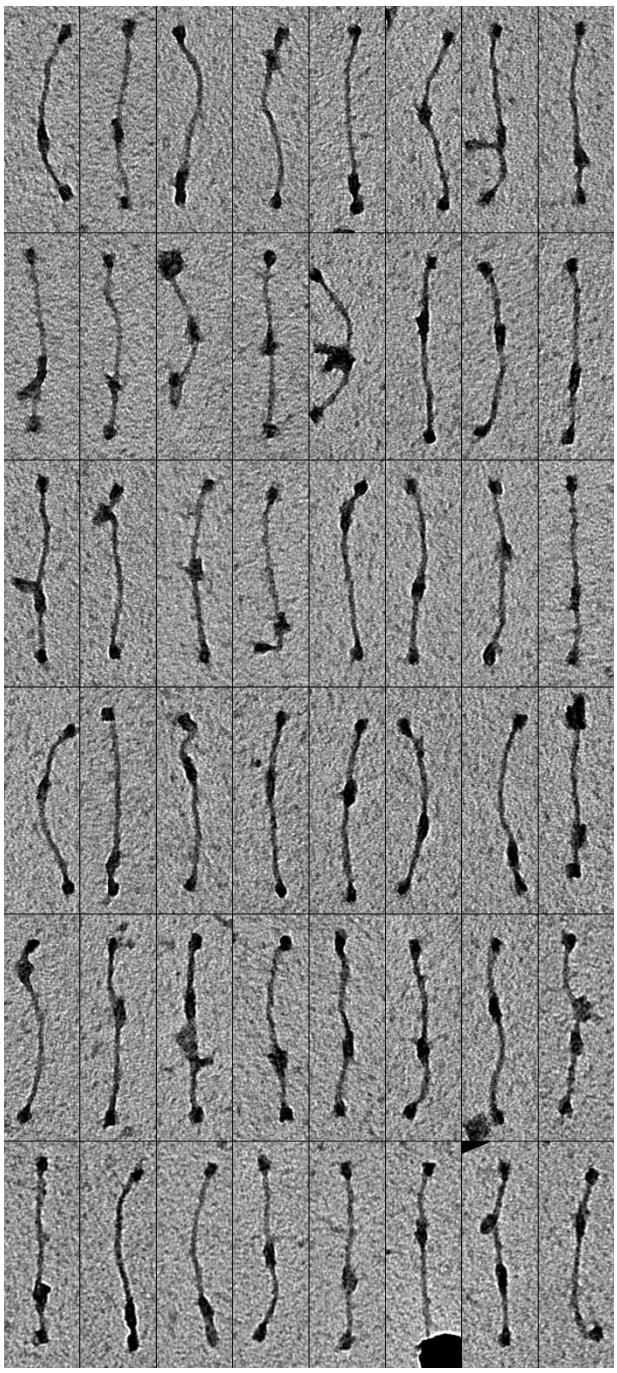

Figure S16. TEM image gallery of one-pot device locked to site C. Images are cropped in 100 × 300 nm boxes.

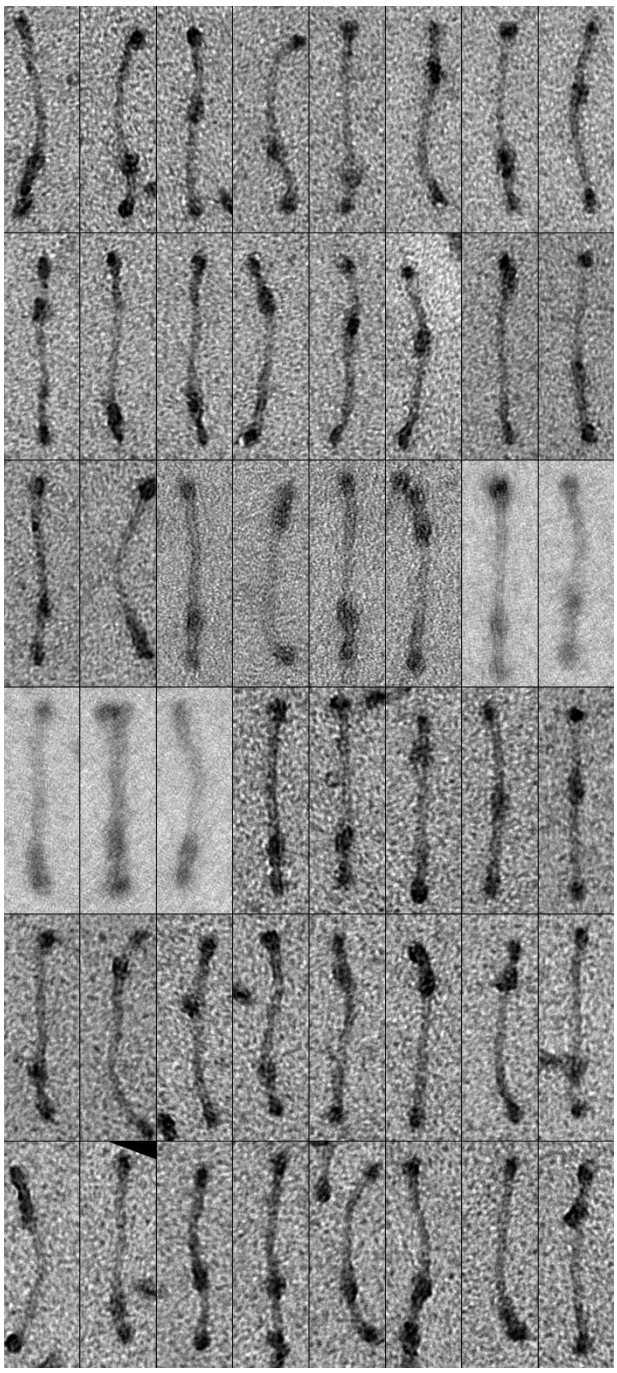

Figure S17. TEM image gallery of one-pot device locked to site D. Images are cropped in 100 × 300 nm boxes.

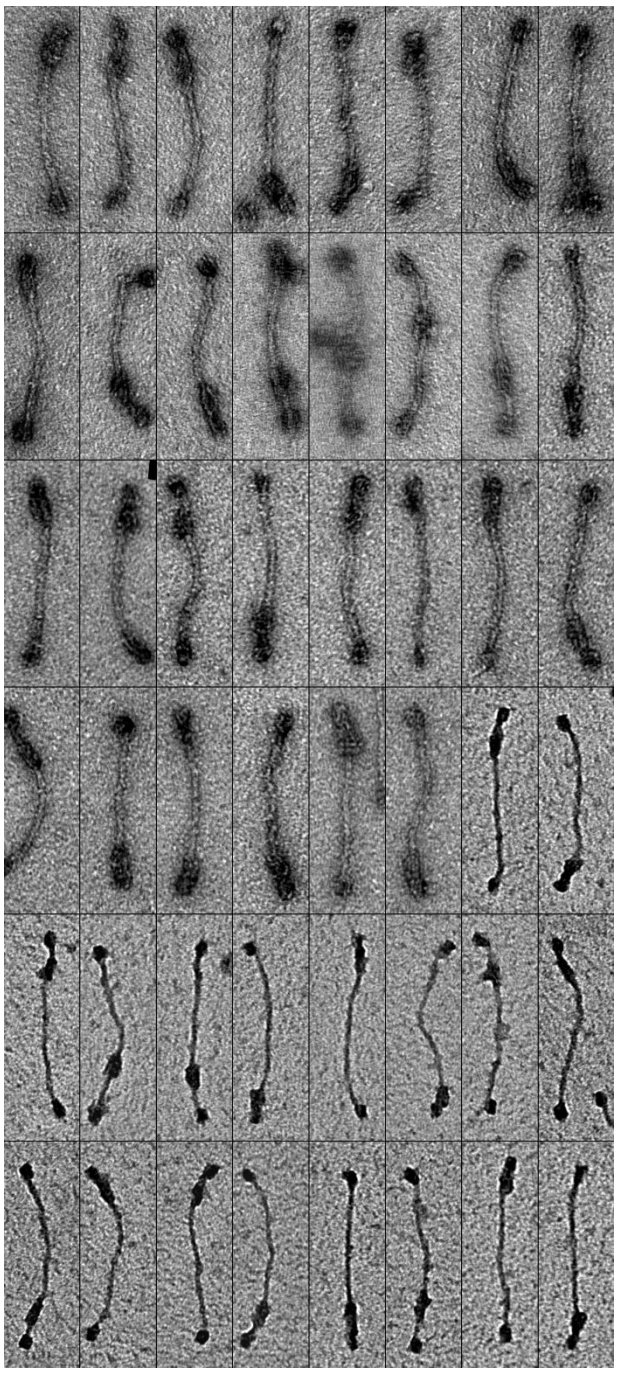

Figure S18. TEM image gallery of one-pot device locked to site E. Images are cropped in 100 × 300 nm boxes.

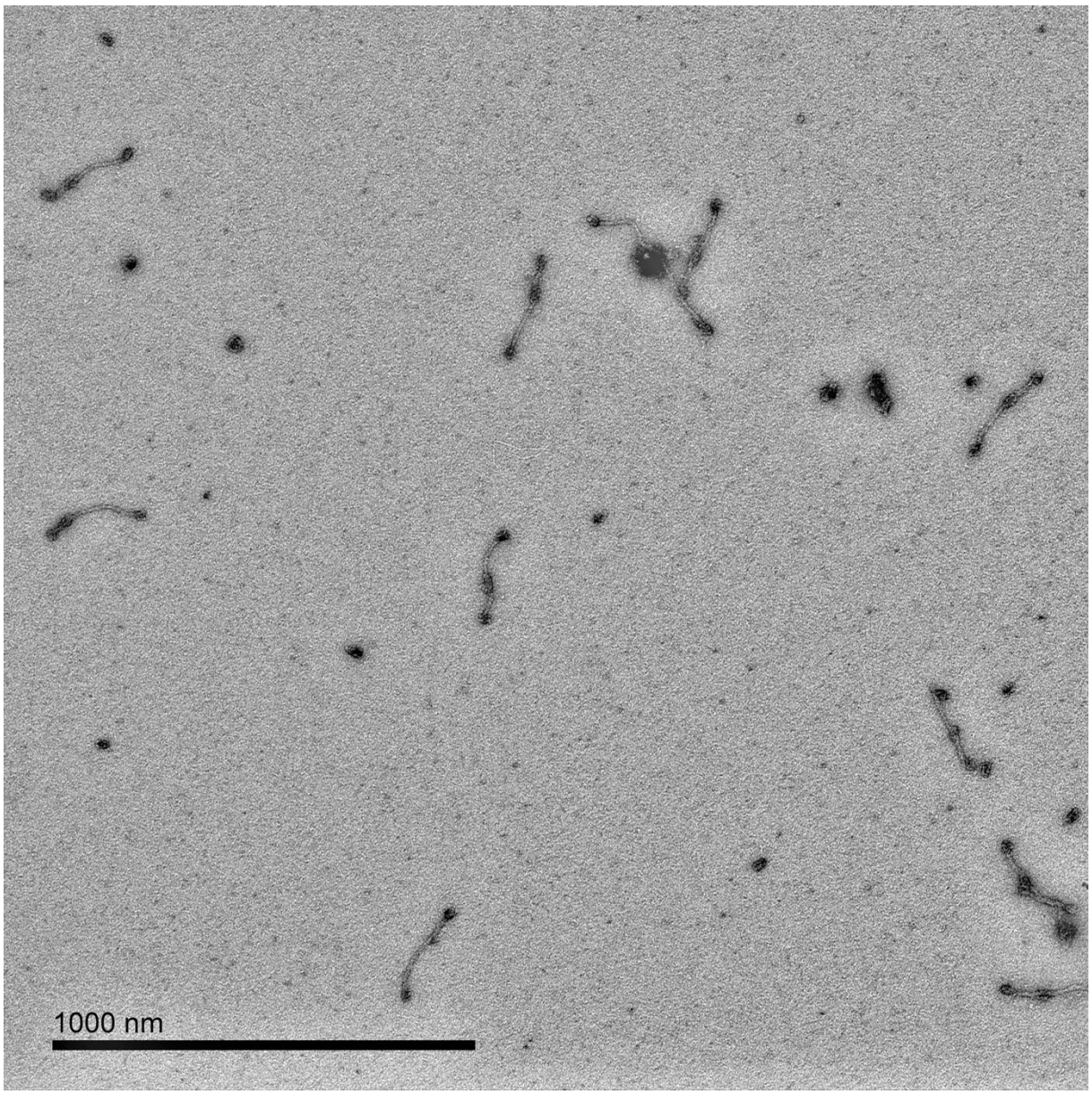

Figure S19. TEM overview of one-pot device locked to site A.

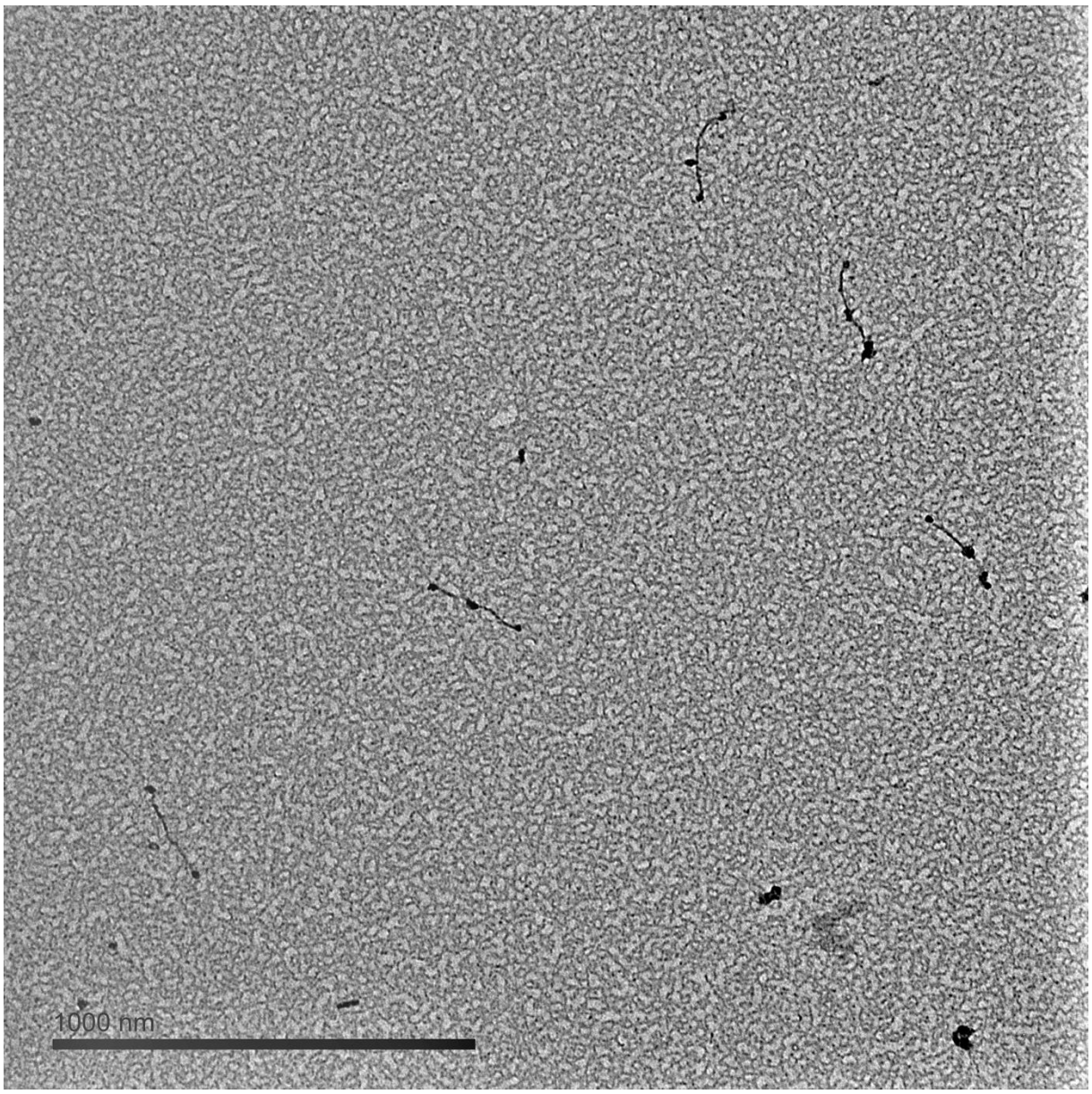

Figure S20. TEM overview of one-pot device locked to site B.

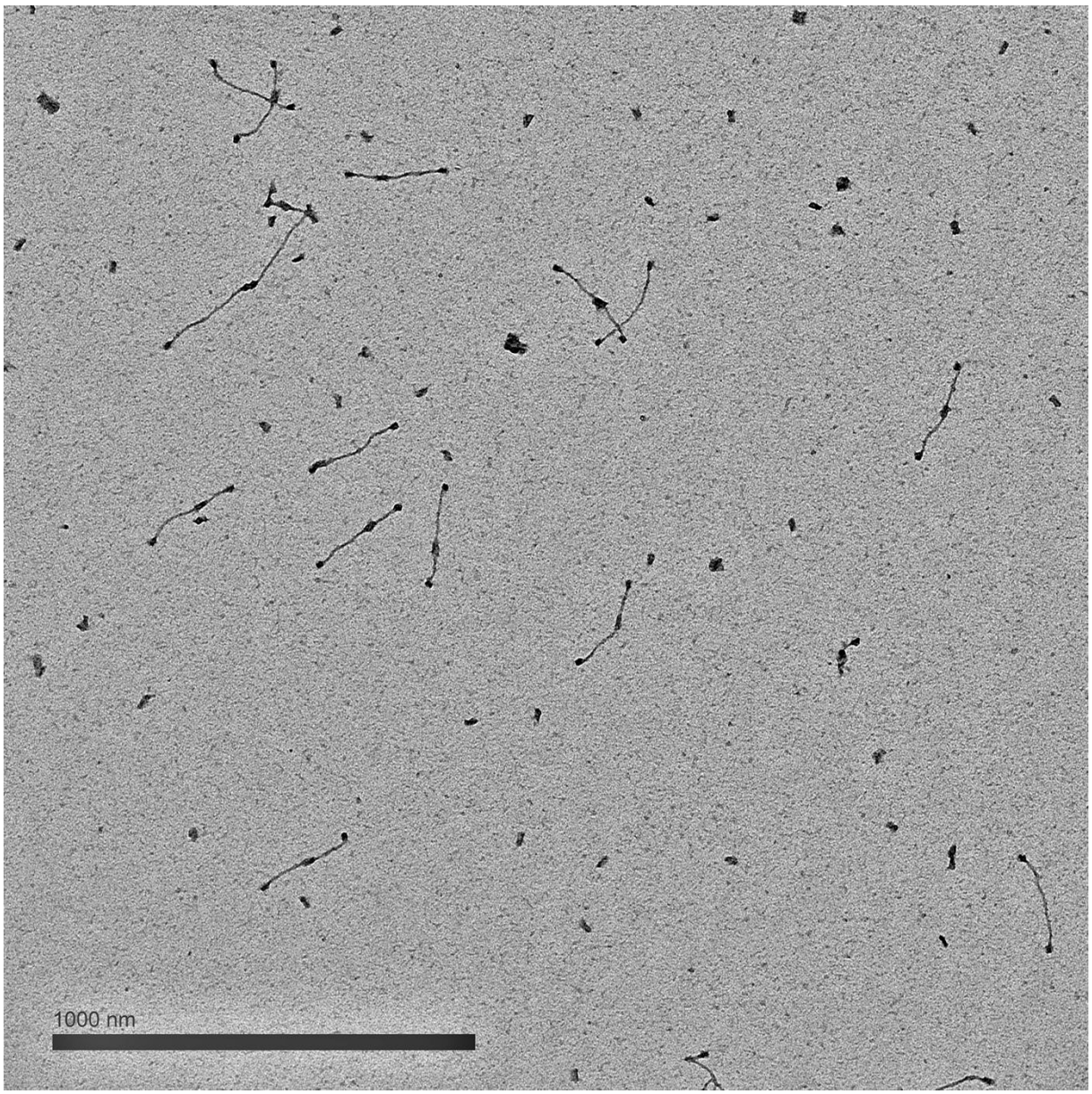

Figure S21. TEM overview of one-pot device locked to site C.

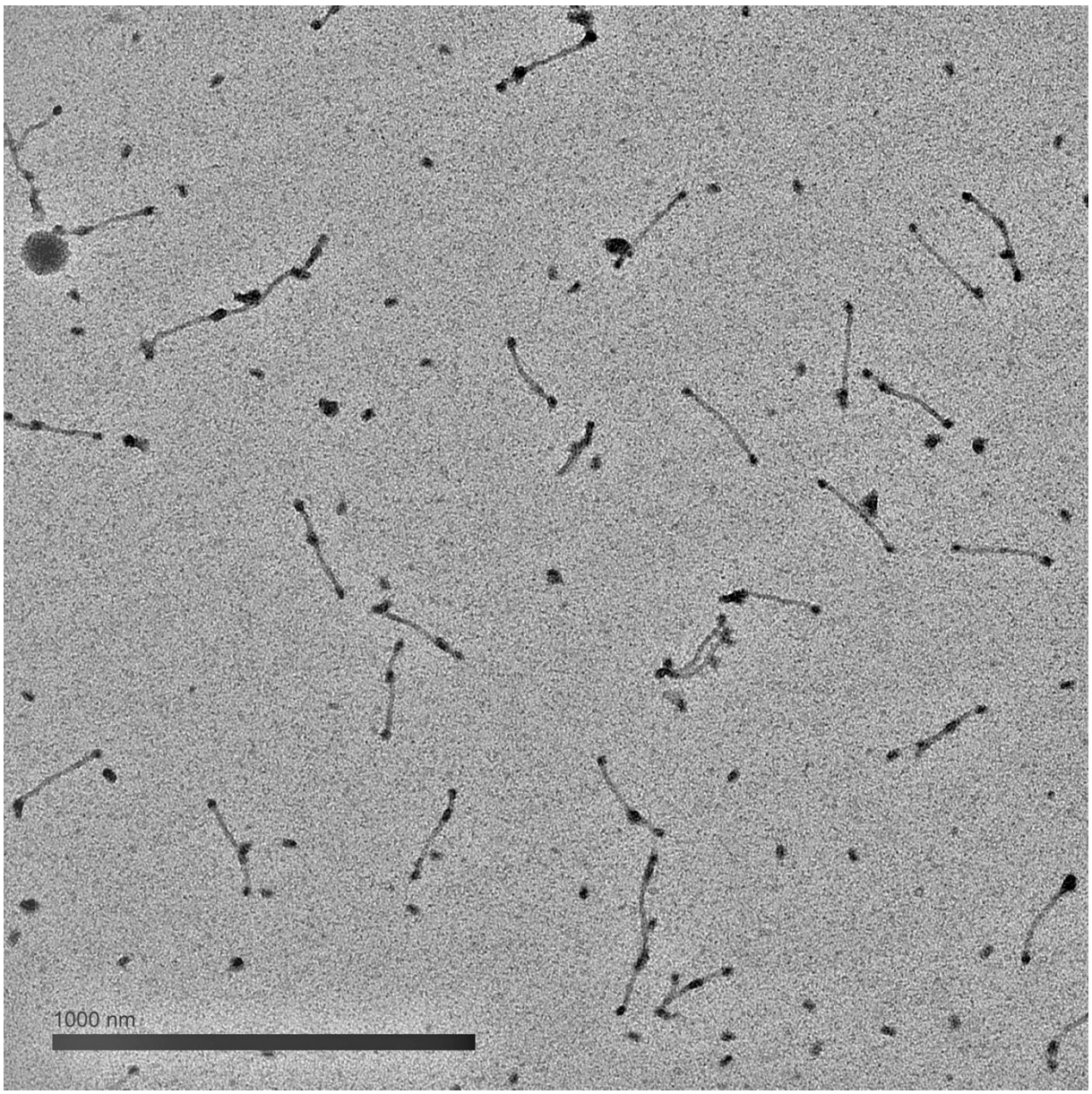

Figure S22. TEM overview of one-pot device locked to site D.

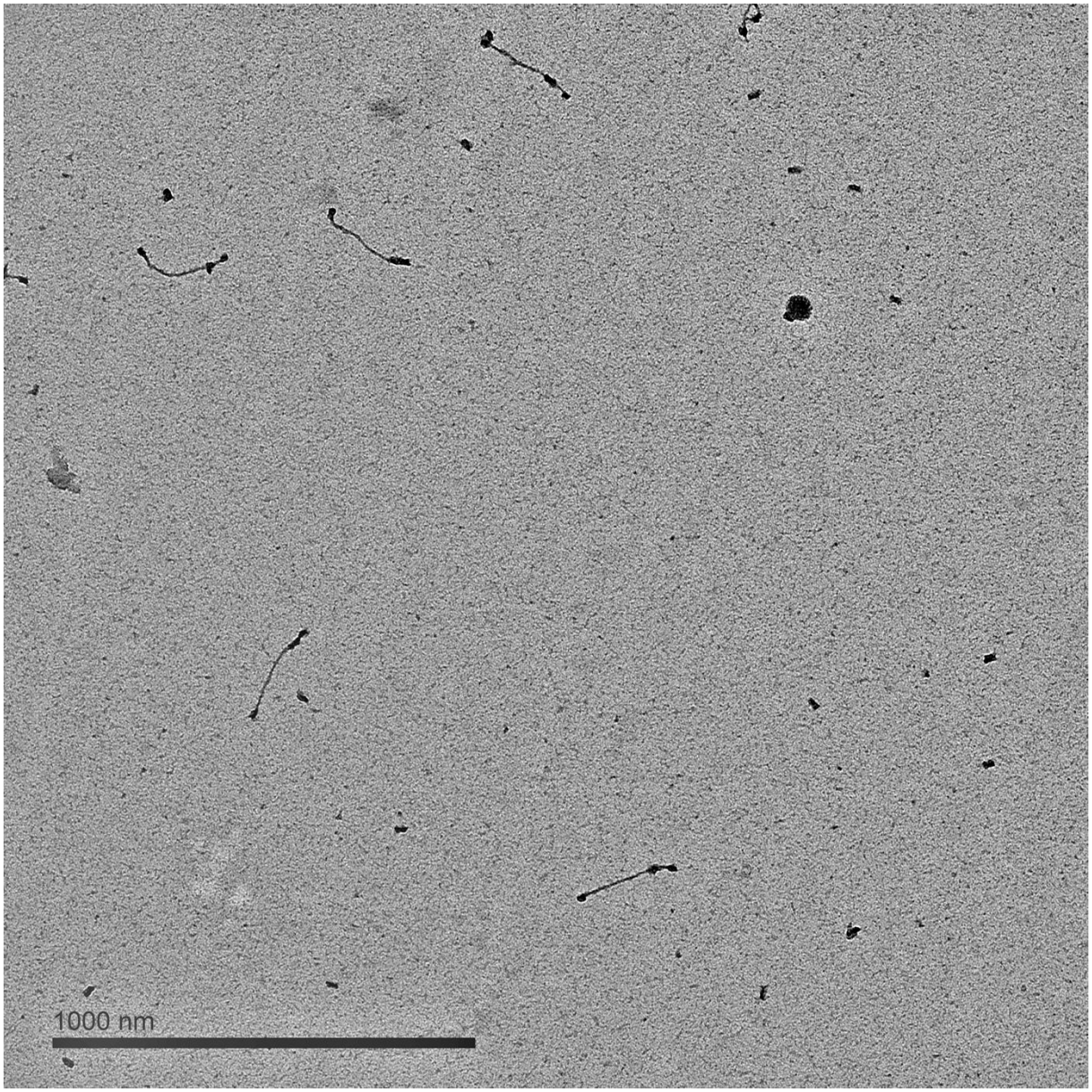

Figure S23. TEM overview of one-pot device locked to site E.

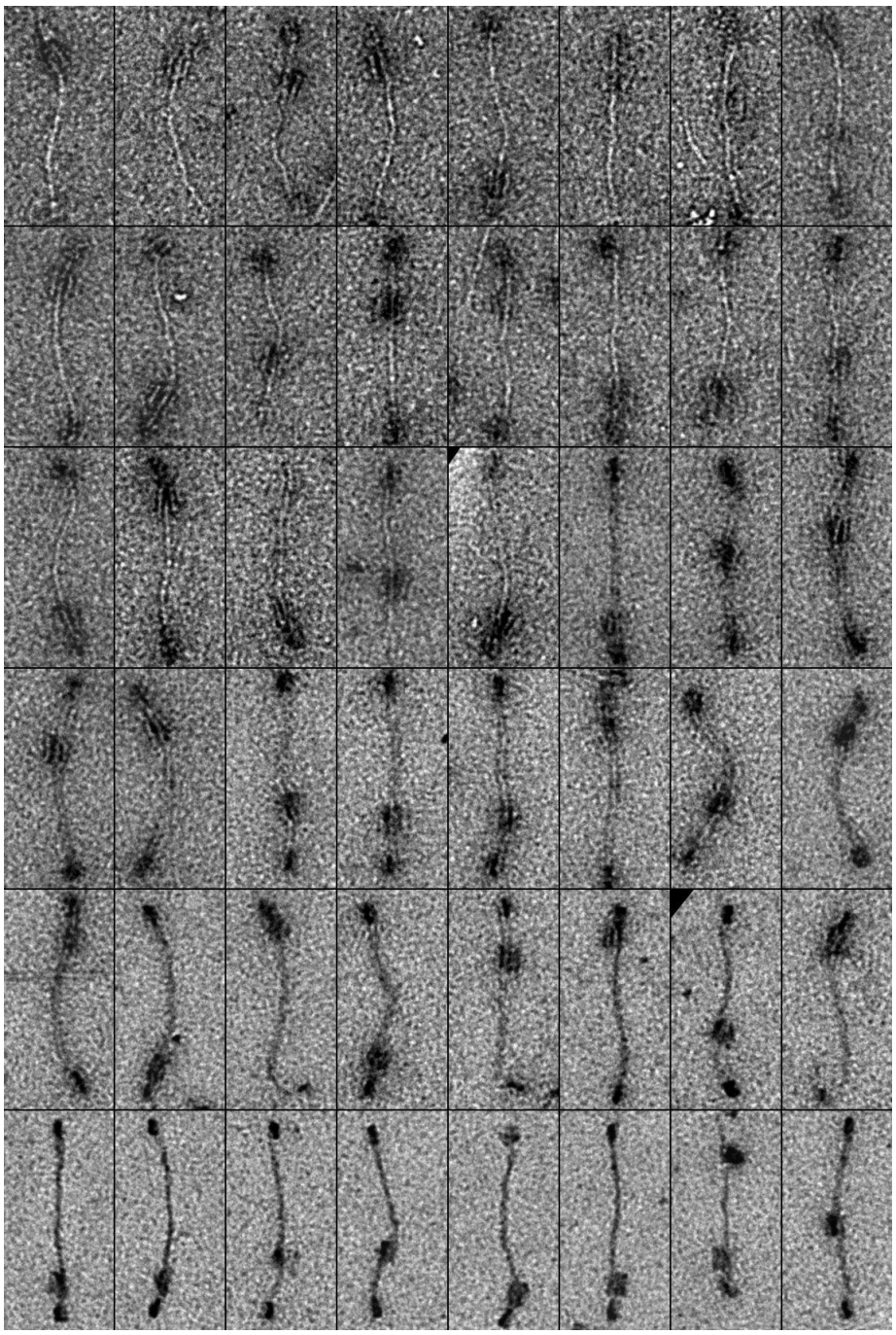

Figure S24. TEM image gallery of two-pot device locked to site 1. Images are cropped in 150 × 300 nm boxes.

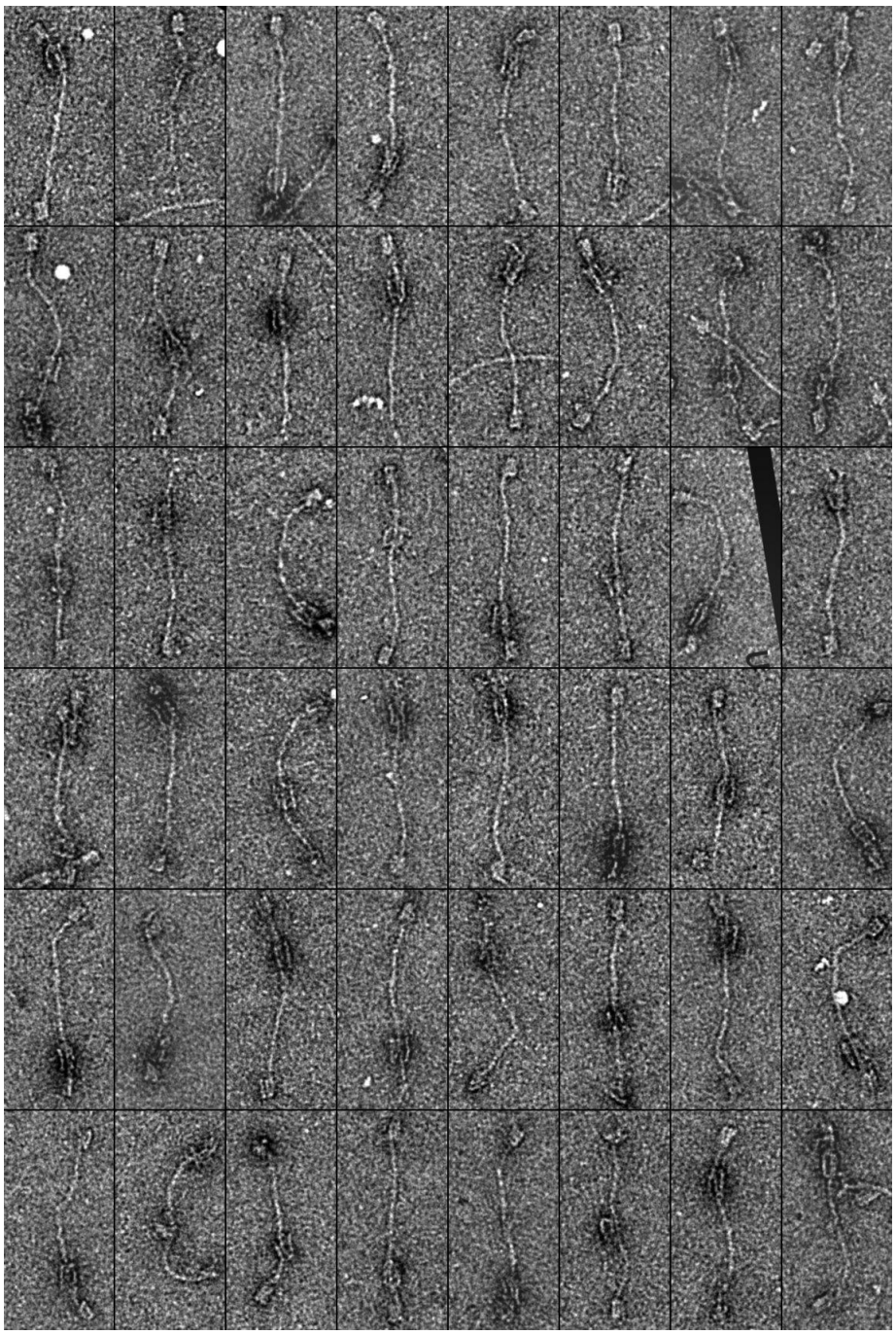

Figure S25. TEM image gallery of two-pot device locked to site 2. Images are cropped in 150 × 300 nm boxes.

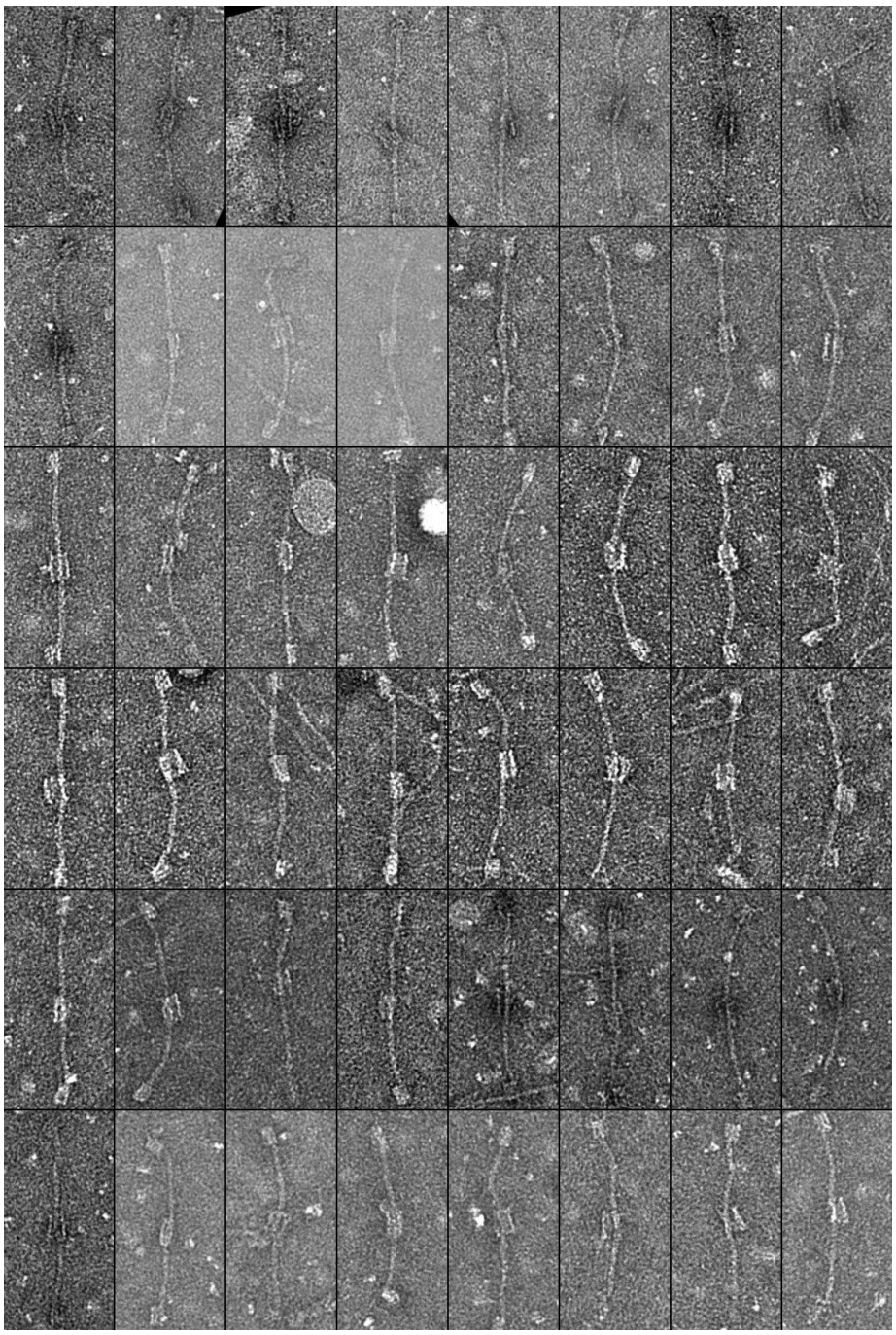

Figure S26. TEM image gallery of two-pot device locked to site 3 (middle). Images are cropped in 150 × 300 nm boxes.

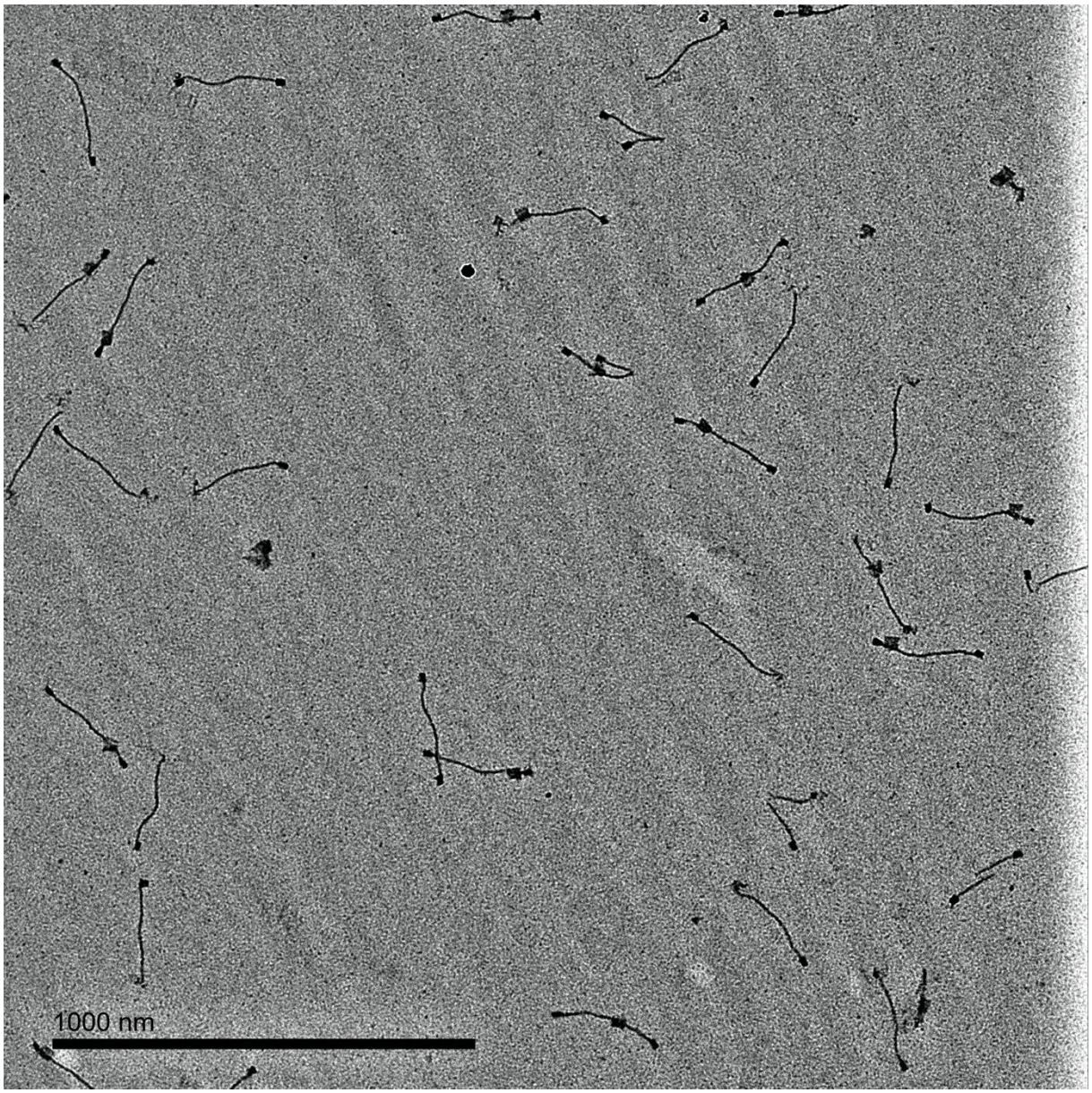

Figure S27. TEM overview of two-pot device locked to site 1.

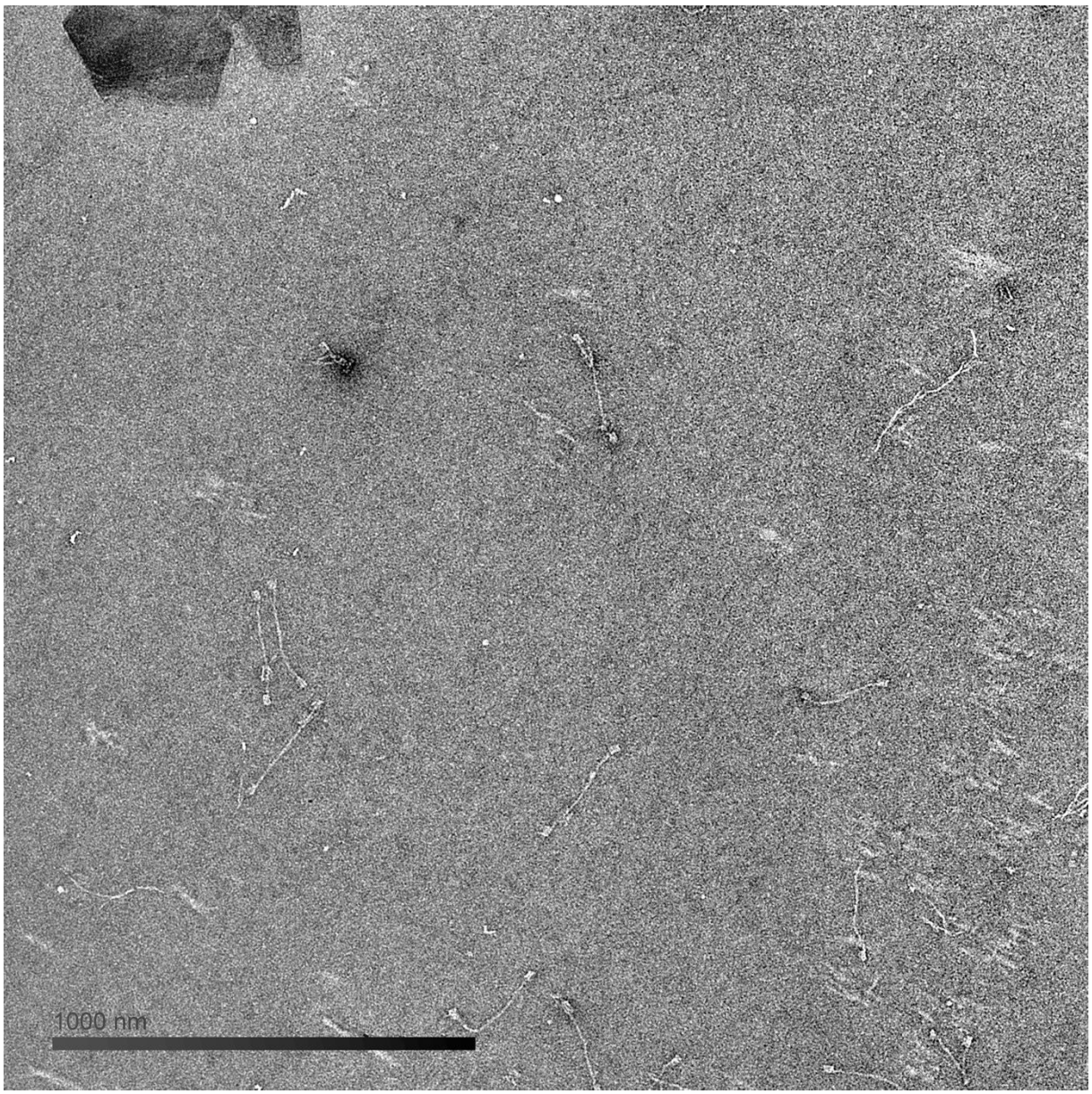

Figure S28. TEM overview of two-pot device locked to site 2.

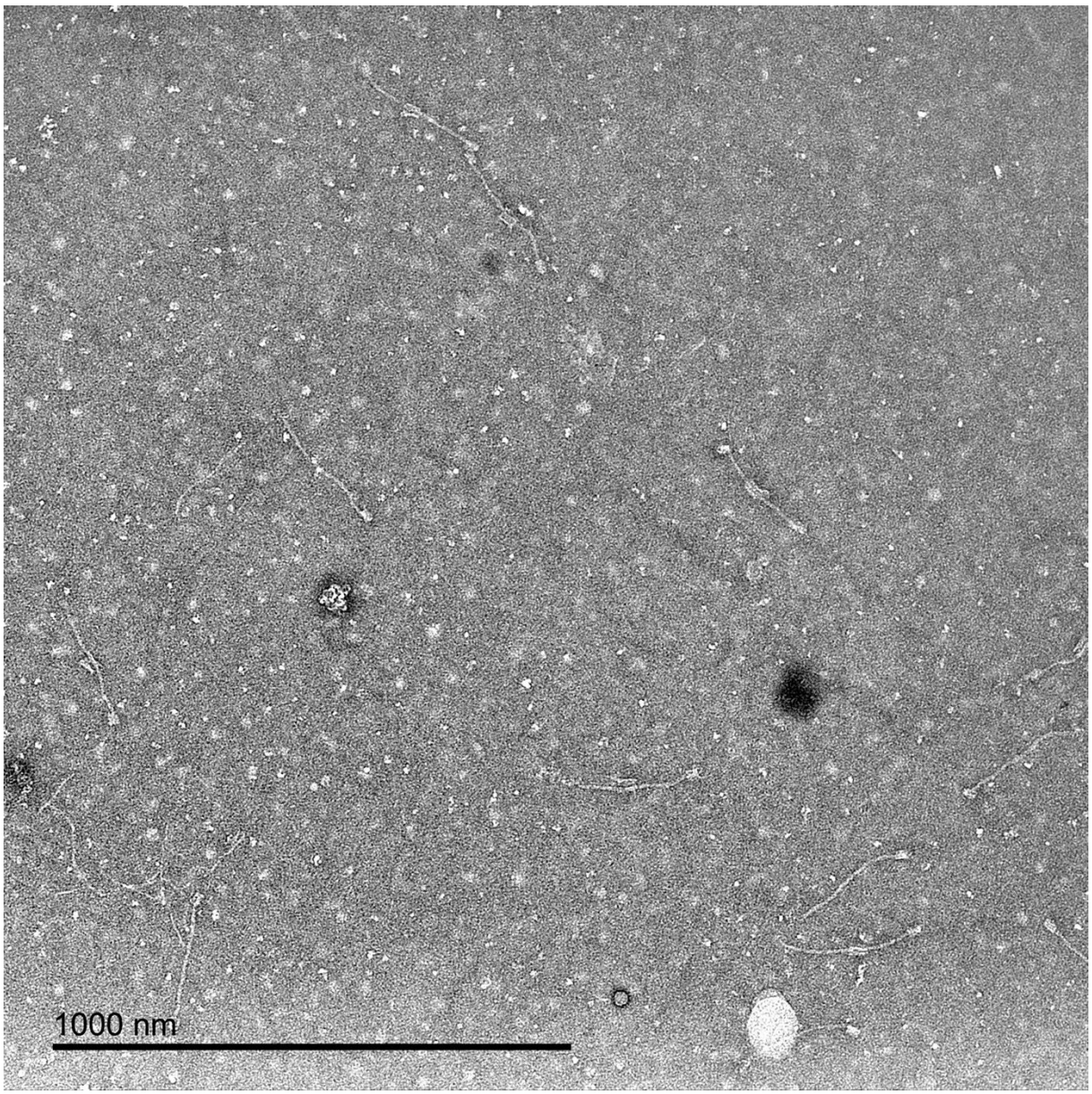

Figure S29. TEM overview of two-pot device locked to site 3 (middle).

Supporting note 1 p2880 scaffold sequence

TGATGCGGTATTTTCTCCTTACGCATCTGTGCGGTATTTCACACCGCATACGTCAAAGCAACCATAGTACGC

GCCCTGTAGCGGCGCATTAAGCGCGGCGGGTGTGGTGGTTACGCGCAGCGTGACCGCTACACTTGCCAGCGC

CCTAGCGCCCGCTCCTTTCGCTTTCTTCCCTTCCTTTCTCGCCACGTTCGCCGGCTTTCCCCGTCAAGCTCT

AAATCGGGGGCTCCCTTTAGGGTTCCGATTTAGTGCTTTACGGCACCTCGACCCCAAAAAACTTGATTTGGG

TGATGGTTCACGTAGTGGGCCATCGCCCTGATAGACGGTTTTTCGCCCTTTGACGTTGGAGTCCACGTTCTT

TAATAGTGGACTCTTGTTCCAAACTGGAACAACACTCAACCCTATCTCGGGCTATTCTTTTGATTTATAAGG

GATTTTGCCGATTTCGGCCTATTGGTTAAAAAATGAGCTGATTTAACAAAAATTTAACGCGAATTTTAACAA

AATATTAACGTTTACAATTTTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTTAAGCCAGCC

CCGACACCCGCCAACACCCGCTGACGCGCCCTGACGGGCTTGTCTGCTCCCGGCATCCGCTTACAGACAAGC

TGTGACCGTCTCCGGGAGCTGCATGTGTCAGAGGTTTTCACCGTCATCACCGAAACGCGCGAGACGAAAGGG

CCTCGTGATACGCCTATTTTTATAGGTTAATGTCATGATAATAATGGTTTCTTAGACGTCAGGTGGCACTTT

TCGGGGAAATGTGCGCGGAACCCCTATTTGTTTATTTTTCTAAATACATTCAAATATGTATCCGCTCATGAG

ACAATAACCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTCGC

CCTTATTCCCTTTTTTGCGGCATTTTGCCTTCCTGTTTTTGCTCACCCAGAAACGCTGGTGAAAGTAAAAGA

TGCTGAAGATCAGTTGGGTGCACGAGTGGGTTACATCGAACTGGATCTCAACAGCGGTAAGATCCTTGAGAG

TTTTCGCCCCGAAGAACGTTTTCCAATGATGAGCACTTTTAAAGTTCTGCTATGTGGCGCGGTATTATCCCG

TATTGACGCCGGGCAAGAGCAACTCGGTCGCCGCATACACTATTCTCAGAATGACTTGGTTGAGTACTCACC

AGTCACAGAAAAGCATCTTACGGATGGCATGACAGTAAGAGAATTATGCAGTGCTGCCATAACCATGAGTGA

TAACACTGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCACAACAT

GGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCATACCAAACGACGAGCGTGA

CACCACGATGCCTGTAGCAATGGCAACAACGTTGCGCAAACTATTAACTGGCGAACTACTTACTCTAGCTTC

CCGGCAACAATTAATAGACTGGATGGAGGCGGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGC

TGGCTGGTTTATTGCTGATAAATCTGGAGCCGGTGAGCGTGGGTCTCGCGGTATCATTGCAGCACTGGGGCC

AGATGGTAAGCCCTCCCGTATCGTAGTTATCTACACGACGGGGAGTCAGGCAACTATGGATGAACGAAATAG

ACAGATCGCTGAGATAGGTGCCTCACTGATTAAGCATTGGTAACTGTCAGACCAAGTTTACTCATATATACT

TTAGATTGATTTAAAACTTCATTTTTAATTTAAAAGGATCTAGGTGAAGATCCTTTTTGATAATCTCATGAC

CAAAATCCCTTAACGTGAGTTTTCGTTCCACTGAGCGTCAGACCCCGTAGAAAAGATCAAAGGATCTTCTTG

AGATCCTTTTTTTCTGCGCGTAATCTGCTGCTTGCAAACAAAAAAACCACCGCTACCAGCGGTGGTTTGTTT

GCCGGATCAAGAGCTACCAACTCTTTTTCCGAAGGTAACTGGCTTCAGCAGAGCGCAGATACCAAATACTGT

CCTTCTAGTGTAGCCGTAGTTAGGCCACCACTTCAAGAACTCTGTAGCACCGCCTACATACCTCGCTCTGCT

AATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCGTGTCTTACCGGGTTGGACTCAAGACGATAGTT

ACCGGATAAGGCGCAGCGGTCGGGCTGAACGGGGGGTTCGTGCACACAGCCCAGCTTGGAGCGAACGACCTA

CACCGAACTGAGATACCTACAGCGTGAGCTATGAGAAAGCGCCACGCTTCCCGAAGGGAGAAAGGCGGACAG

GTATCCGGTAAGCGGCAGGGTCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGGAAACGCCTGGTATCT

TTATAGTCCTGTCGGGTTTCGCCACCTCTGACTTGAGCGTCGATTTTTGTGATGCTCGTCAGGGGGGCGGAG

CCTATGGAAAAACGCCAGCAACGCGGCCTTTTTACGGTTCCTGGCCTTTTGCTGGCCTTTTGCTCACATGTT

CTTTcctGCTGAGGCCGGCTCTGGCGAAGATTTCTAAACTTCCCAGAACGTTAAGAGGCTGTGAAACCGCAC

ACCTCCTAGTCGATCGTAGGGCGAAGGGAGCGAGTCCAGACCTAAGTTATTATAGTCACCAGTACACGCCGC

AATTAGTTCGGGGCTATTCATAAATCGTCATCACTCATGCGTCTCGCTGTTTTAGGGTTGGTTACGGGGTGT

GATTTTGAGAGCACGACAAGGTATTCATGATTTCGTGTTAATACTATGACAGTCCATTCAAGACTTGGCGCC

Supporting table 1. Staple strands for one-pot device

Name	Sequence	Description
Core5	CGATTGATTTTCATCGAAATCAGATGCGCCA	Core of Rail
Core6	TTTATTACGCAGTATTGGCAACATATATTT	Core of Rail
Core7	TTCAACCAGTAAGAGCAACAAAGTGTGACCATCAAAGAAAGG	Core of Rail
Core8	TTTGTATAAAGCAATACCGACCGTTTAACAGCAAAATGGTTTACGA	Core of Rail
Core9	TACCGTTTTTCGAGAACAAGCATAAAGTTTTTTCGAGCC	Core of Rail
Core10	CAGCAAGCGGTTGCCTGGCCCTGAGATTGCGTATTGGGCGGGCAAAAGGGTGTATGATA	Core of Rail
Core11	AGAATGAAGGGTTTAATACATACATAACC	Core of Rail
Core12	GATTCAACAGCTGATCACTGCATCCTGTAAATATTAAATCAAAAAT	Core of Rail
Core13	AAGACAAAAGTTCATATGGTTTACGTCACAAAGACAAGGGTTA	Core of Rail
Core14	GTCAGGATTGATTAAGAGGAAGCCCGAAGCAAACTTGCTCCT	Core of Rail
Core15	ATTGTATAAGGAAAAGCCCCAAAAACCCTTCCTGGTCAATCA	Core of Rail
Core16	CTCCATGTTACTCAGAGCGAACTT	Core of Rail
Core17	AGTAAAATAAACACCGGTCATATGCGAATTTCATGTTT	Core of Rail
Core18	CAACAGTTACGGGAGAATTAAGAGCGCTAATATAGCCATAT	Core of Rail
Core19	CATTGTATTAACGGAAAGGTGAAATTTAATACGGAAATTATT	Core of Rail
Core20	GATATTCATTACAGCGAAAACGAGAAACACCAGGAG	Core of Rail
Core21	CGGTGAAGCAGGCGAAGCTGGTGCCAACCGCTTT	Core of Rail
Core22	TTTTAGGGAGGGAAGCGTTAAATAAGTAAATTCTGTCCAGGACAACGCTATACAAAT	Core of Rail
Core23	GCATCAAAAATTTTACAGTTCAGAAAACGAGAAAAGCGGATT	Core of Rail
Core24	TTTAATTCTTTTTACCCTGACTATTATAGTCAAATATCGCGT	Core of Rail
Core25	GCTTATCCGGTATTCTATTTTCGCCCAATAGCAAGCTAGGAATCAT	Core of Rail
Core26	TTTGAGGAAACGCAATTAAGACTCCTTTTAAGCCTG	Core of Rail
Core27	AAAGATTGAGTGTTCGCCAAAAGGAATTCTAATGACGATAAAAACCAAATTTTTTTTTTT	Core of Rail
Core28	TCAACTTGGGGTCGCAGTCAGGACGTTGGCGAAAACAGGTAG	Core of Rail
Core29	ATAAGGCTACGGGGATTTAATT	Core of Rail
Core30	CAGCATCCGCTCATTCATGAGGAAGTTTAACTATCAACGAAA	Core of Rail
Core31	GATACCGGACCTGAATTCGGTCGCTGAGATTCACCCGAAAGA	Core of Rail
Core32	ACAACTAAAACAGAGGCTCCAAAAGGAGCGCGAACACAGCTT	Core of Rail
Core33	CAGCCCTGGTCAGTAAATGAATTTTCTGCAAATGAGAAAGGA	Core of Rail
Core34	TCAGAACACTTTACAGGAACCCATGTACCACTAACCCACAGA	Core of Rail
Core35	TTAGCGGATTCCTGAGTATAGCCCGGAATTTGAGTGCCACCC	Core of Rail
Core36	ACGGGGTAATTGCGATTTCGGAACCTATGAATAATATTAGGA	Core of Rail
Core37	TGATATTAATTATTGAATTTACCGTTCCGAGAAACAGTTTTA	Core of Rail
Core38	CCCTCAGTATGTGAGCCACCAGAACCACTAATTACTTGGCCT	Core of Rail
Core39	AGTTTGCTCATAGGCCCCTTATTAGCGTTTGAAAAACCGCCT	Core of Rail
Core40	CCGACTTGTTAATTATTAGCAAGGCCGGAATGCTGAGAATCA	Core of Rail
Core41	TTTTAGAAACCAATCAAAATGCAGACCGTCA	Core of Rail
Core42	TTTATAGCGAAAAGCCTGGGGTGCACGAGGCCCCGAGATAGGGTTCATCAGTTCCAACG	Core of Rail
Core43	TCAAAGGGGAAGAAAAATCAAGTTTTTTTAATCATCGATTTAGAGCT	Core of Rail
Core44	CCCCTGTGAATTACCTTAATCACCCAAATCTACGTTAATCGTGGACTGAG	Core of Rail
Core45	AAATACGTTGCCTGCACTAAAACACTCAGAGTCTGATTTGTA	Core of Rail
Core46	AAAGGCCATGGATTGGGTAGCAACGGCTCAGCCATACGGGTA	Core of Rail
Core47	GGTTTATAATGGCTCGCCGACAATGACACAACAGAGGGAGTT	Core of Rail
Core48	AAACAACTGCCACGTGCGAATAATAATTACGAACCTTGTATC	Core of Rail

Core49	TCGTCACTATCTAAAGCGTAACGATCTATCAAACCTTTTGCT	Core of Rail
Core50	TACTCAGGAACGTTCTCAGAGCCACCACTTGAGGACTGAGTT	Core of Rail
Core51	AAAGTATGATTGTTCTCAGTACCAGGCGAAGGAGCATCACCG	Core of Rail
Core52	ATGGCTTTAACAGTTTGAGTAACAGTGCCACGTAAAAACATG	Core of Rail
Core53	CCAGCATCAAACATAAATAAATCCTCATTTACAAAGTCATAC	Core of Rail
Core54	TAATCAAATTAATTACCCTCAGAACCGCGAAACAGGCCGCCG	Core of Rail
Core55	AAACCATTGGGTTAGTCAGACTGTAGCGTCAATAGCTTTTCA	Core of Rail
Core56	TCCTTATCAATAAATTAAGCGTTTACAGAGAGAATAACTTT	Core of Rail
Core57	TTACAAGAACTTTTTTGTTTTCCCAATCCAAAAGGGCTTGTAAAGTAGAGAATAAGCCGT	Core of Rail
Core58	ATACTATCAGCGTTGCAATCAAAACCA	Core of Rail
Core59	CATCCACTATTAAAGAAAAAACGACCACTACG	Core of Rail
Core60	TGAACCTGCGATTCGGAACCCTAAAGGAACGAGTAAGGAAGG	Core of Rail
Core61	GAAGAACCAAATCCGCGTAACCACCACCAGGCGCGACGAGCA	Core of Rail
Core62	CGTATAGGTCAATTAAAGGGATTTTAGCTGATAAGCCACCGA	Core of Rail
Core63	GTAAAATCTTTGAAGTAATAACATCACTAATGCCAACAATAT	Core of Rail
Core64	TACCGCACAGAGGCTCAATCGTCTGAAGCTTTTGAGGGACAT	Core of Rail
Core65	TCTGGCACAACCAAGACAATATTTTTGCAGCTTGATTAAAAA	Core of Rail
Core66	TACCGATTTTCACACCGCCTGCAACAGTTTCAACCTGAACCT	Core of Rail
Core67	CAAATAAAGTTTTGAATTGAGGAAGGTCAGTACAAATAGATA	Core of Rail
Core68	ATACATCCTCATTTAAATCCTTTGCCCGAGGTTTAAAGAAAC	Core of Rail
Core69	CACCAGGATAAGTATCAATATAATCCTTAAGAGGATCAAAAT	Core of Rail
Core70	TATTTGCCGTATAAGATGAATATACAGTTGATGACTTTGAAT	Core of Rail
Core71	ACCAAGTAAAGCCAGAAGATGATGAAATGACAGGTACCTTTT	Core of Rail
Core72	TTAATGCACCCTCAATCGTCGCTATTAAATCACCGACGCTGA	Core of Rail
Core73	GAAGAGCGTTTTCCCTCCGGCTTAGGTCGATAGCAAAGAACGCGAG	Core of Rail
Core74	CTGGCTCCGATGGCACTAACGGAACAACCAAGAGTTCAACTA	Core of Rail
Core75	CAAAGCTGGCGAGAAGTAAATTGGGCTTACTAAATTTAAGAA	Core of Rail
Core76	GAACCGATTGCTTTATAGGCTGGCTGACCACGCTGAACGTAA	Core of Rail
Core77	CGATTATCAGTGAGATTGTGTCGAAATCGGCCGATCATAAGG	Core of Rail
Core78	GACTAAATATCCAGACTACGAAGGCACCTTTGATTCCCCCAG	Core of Rail
Core79	CGCATAATAATAAACGGGATCGTCACCCTTTGACGCTTTGAG	Core of Rail
Core80	ATCTCCACATCGCCCTTTCGAGGTGAATGTGGCACTCGCCCA	Core of Rail
Core81	TTCCAGACACCTTGAGTTTCAGCGGAGTTATTAACGTTGAAA	Core of Rail
Core82	ATAGCAAAGCCGTCAACTACAACGCCTGTTGAAAGGTCGTCT	Core of Rail
Core83	AGAGGGTGCGGAACAGTACCGCCACCCTCTCGTATTTCAGGG	Core of Rail
Core84	AATGCCCCTACCATCTGAGACTCCTCAAGCAATTCGCCGTCG	Core of Rail
Core85	AAAGCGCCTGATTGTACAGGAGTGTACTTAACGTCAACAGTT	Core of Rail
Core86	CCACCCTTTTGAATAGGTTGAGGCAGGTGAGCAAAAGAATGG	Core of Rail
Core87	TTTTCGGAGATTAAGGAACCAGAGCCACTTCTGTAAGAGCCA	Core of Rail
Core88	CACCAGTAGCACGCAAGACAGCACCGTAATCAGTTTTTAAATCGGCA	Core of Rail
Core89	TTTGGAAATTATTAACCGTCTATCAGGGATTATACAGGTGCC	Core of Rail
Core90	TTTCTTTTCACCAGTGAGACGCCAGGGTGGTTTTTGGCCAA	Core of Rail
Core91	CAAATGCTTTAATTTTAGGGGGTAATAG	Core of Rail
Core92	AATATAATAAAGTACGGTGTCCAATTCTGGGAGAGG	Core of Rail
Core93	ATGATAATAACGGAATACCCGAACAAAGTTACAGAA	Core of Rail
Core94	CCTTTTGTGCTAAAAAGAACTGGCGCAAACGT	Core of Rail
Core95	AATAGCTATCTTACCGTTGCCCAATAATAAGACCACAAG	Core of Rail

Core96	AATGCCTGATTTTTGTAATGTGTCTGATAAATTAAT	Core of Rail
Core97	TTTAACGTCAAAAATGAAAATAGCAGCCCATTAGAAGAAACGATGTCTT	Core of Rail
Core98	ACCTGTTTGATTCCTGGAAGTGAGCTTA	Core of Rail
Core99	TATTTATTTTGTTACAAAATAAACCAGAGAGATAACGCAAGAAACAATAGCCTAATTTGCCATTACGAGCGTCTT	Core of Rail
Core100	CGCGCGGCGAACGGCAAATGGTCAATAAGCTGAAAAGGTGGTCCAATA	Core of Rail
Core101	TCCAGGAAATAGCAAGTAAGCAGATAATCTTCCTGAG	Core of Rail
Core102	TTTTAGATTTATTTGTACCAACTCAGAGCATAAAGATTAACACATCAAT	Core of Rail
Core103	CCCTGAATTATAAAAACAGGGGGGAATTAGAGCAACTTTTACCAATG	Core of Rail
Core104	ATTTAGGAATAGAATAGATGTTCTAGAGGTAAA	Core of Rail
Core105	GTGCTCATTGCAAGTGTAGCGGTCTTCATCGGCGCGTACTAT	Core of Rail
Core106	TCTTACTTTAGTAAATCATAATTACTATTGTGATAAATAAGGGTAAATACATTCAAC	Core of Rail
Core107	AGAGGTCGAACCAGACCGGAAAGACTTCAGAAGCATGACCAT	Core of Rail
Core108	AATTGAGGTCAGAGGGTAATTCTGAACA	Core of Rail
Core109	TGGTCATAGCTGTTTCCACTACATAAGTTCCAG	Core of Rail
Core110	ACATTTCAGTAGATATGCAACTGCTGTACTTTAATCCAACAG	Core of Rail
Core111	TGTAATTAGCAAAATTAAGCACAGGCAAGGGCGCG	Core of Rail
Core112	CAGGTCTTTTTTCGGAATCGTCATTTGATGGTTGCCCCGTTG	Core of Rail
Core113	TCAACCTAAGGCCTTGCTGGT	Core of Rail
Core114	AAGACTTTTGGAAATACCTAC	Core of Rail
Core115	ATTCAGCAGAGTCACACGACC	Core of Rail
Core116	ACTTCTTAATGATAGCCCTAA	Core of Rail
Core117	AAAAAAAAAGGTGAGGCGGTC	Core of Rail
Core118	AGGAGAATAAAAATCTAAAGC	Core of Rail
Core119	ATCGTTAGTTGGCAAATCAAC	Core of Rail
Core120	AGGCCCAATAAACAATTCGAC	Core of Rail
Core121	AACAGAACCAACATTATCATT	Core of Rail
Core122	TTTGATATAATTATCAGATGA	Core of Rail
Core123	TGGAGAAGGGGAAGGGTTAGA	Core of Rail
Core124	TTGGTAATAAATAACGGATTC	Core of Rail
Core125	GCAGTCTCTCATTTCAATTAC	Core of Rail
Core126	CTCAGACGAATTTAACAATTT	Core of Rail
Core127	GCCACCGGACATAGCGATAGC	Core of Rail
Core128	TTTCATAGCTCTGAGAGACTA	Core of Rail
Core129	CCTAGCGACATGCAAATCCAATCCATTACCTCATCTT	Core of Rail
Core130	ATAACGGAGTCCATCACGCAA	Core of Rail
Core131	CACCATTAATGCAACAGGAAA	Core of Rail
Core132	AAGGAACGAATTTACATTGGC	Core of Rail
Core133	AGGCTTGCAGATAGAACCCTT	Core of Rail
Core134	TGCCTTTAAACCAGCAGAAGA	Core of Rail
Core135	TAAAGGAATCTGAGAGCCAGC	Core of Rail
Core136	AGTATGGGACTCAATCAATAT	Core of Rail
Core137	CTCATAGTTAATATCTTTAGG	Core of Rail
Core138	AGCGCCACCATTAATTTTAAA	Core of Rail
Core139	AGTAGGTGTGGAATTATCATC	Core of Rail
Core140	ATGGTTTTGTGGATTATACTT	Core of Rail
Core141	CTTATTCTGAACAGAAATAAA	Core of Rail
Core142	GGAGTAAGCATCGCGCAGAGG	Core of Rail

Core143	CGCACAAACCAAGAAAACAAA	Core of Rail
Core144	ATCACCAGATACATAAATCAA	Core of Rail
Core145	CCTTGCCATTGAATTTATCAA	Core of Rail
Core146	AACTTTAGCTATAACTATATG	Core of Rail
Core147	TAAAACGTCTCAAATATATTTTAGAGCCATCAACATG	Core of Rail
Slider_core1	TTTTGGTCAGCAGCAACCGCAGCGTGGT	Core of slider
Slider_core2	GTGCCATCCCACCAACGGCAGCACCGTTTACACTGTCATAACGGAACGTGCCGGCCA	Core of slider
Slider_core3	GGTGTCGCTGGTCCTGCGCAGCATCAGCGGGGTCTACGGCTGGA	Core of slider
Slider_core4	TCAATCCGGTTGCAATGGGTAAAGGTTTTAAACATCCCCGGTG	Core of slider
Slider_core5	ATTAAATGTGAGCGAACGGCGGATTGACCGTAATGAAAACTAGCATTAGCCAGCT	Core of slider
Slider_core6	CGTGCATCTGCTTTTTCAGTTTGAGGGTTCGCTATTTT	Core of slider
Slider_core7	AAGATCGCAACTGTTGGGAAG	Core of slider
Slider_core8	CTGGCGAACGGGCCTCGACGACGACAGTATCGATGGGCGC	Core of slider
Slider_core9	AGAAACAGTAGCTCTCACGGAAAAAAAACGACG	Core of slider
Slider_core10	ACTTAAATTACCGGGGTGCGGCGGGCCGTTTTGATGAAGGGTGAGCACATCCAGACGA	Core of slider
Slider_core11	TGGGCGGTAAAGCCGCAAACGATGCTGATTGCCGTCGCTGGCAGCCTCCGGACTTG	Core of slider
Slider_core12	TAGAACGTCAAGAATGCGCAACCAGCTTTT	Core of slider
Hinge1	TATGTACCACAAGAGAATCGATGACGGCACCCATTC	Hinge of slider, add after closing
Hinge2	CTTCTGGTGCCGGTTTTTTCTGGAGCAACCGGTTGATAATTT	Hinge of slider, add after closing
Hinge3	AAGTTGGGGGCTGCGCACTCCAGCCAGCTTTCACGGTAATCGTGGATAGGT	Hinge of slider, add after closing
Hinge4	TTTTCTGTGGTGCTGCGGTGCGCGCCTGTGCACTTT	Hinge of slider, add after closing
Hinge5	TCCAGCGCAGCGGTGCCCCCTGCATCGTGTGTTC	Hinge of slider, add after closing
Hinge6	CGGTGCTGTCACCCAGAAGTTTCTGCCAG	Hinge of slider, add after closing
Hinge7	GCTGGTCGTCCGTTTTTTCGTCTCGTTCCGGCAAACGCGTTT	Hinge of slider, add after closing
Digestion_1	AGGGTAGCTATTTTTGAGAGATCTACAAAGGCTATCAGG	Staple creating scaffold digestion site
Digestion_2	CCTCCTCACAGTTGAGGATCCCCGGGTACCGAGCTCGAA	Staple creating scaffold digestion sites
Slider_paint1	GGGTTTTCCCAAGCTTTTATCTACATA	DNA PAINT site on slider
Slider_paint2	GTGCTGCACGGATAACTTATCTACATA	DNA PAINT site on slider
Slider_paint3	TGAAGGGACGGATCAATTATCTACATA	DNA PAINT site on slider
Slider_paint4	CGGAATTTCCAGCAGTTTATCTACATA	DNA PAINT site on slider
Slider_paint5	TCGACATAGTACAGCGTTATCTACATA	DNA PAINT site on slider
Slider_paint6	AAAGTTACAGGCGGCCTTTAGTCACGGTCATTCTGCTCATTTGCCGGTGAGAGATTATCTACATA	DNA PAINT site on slider
Stopperpaint1	TTTAGAAGTTCGAGCCGGAAGCCCAGTCGGGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint2	ATGCAGAATTAATTTATGGATAGCGTCCAATACTGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint3	TTTTTCCACACAGACGAGTGAGCTAACTCTGTGTGAAATTGTTATCCGCTCACAATTATACATCTA	DNA PAINT site on stopper
Stopperpaint4	TTTCGGCAAAATCCCTTATAGCTTGCCCTTCACCTTATACATCTA	DNA PAINT site on stopper
Stopperpaint5	TTTCACGCTGGTTGGTTCCGAAATTTATACATCTA	DNA PAINT site on stopper
Stopperpaint6	TAAAATGTCCCCCTACCTGTCCATTAATGAATCTTATACATCTA	DNA PAINT site on stopper
Stopperpaint7	CATTGAATTTAGACACCCTCGTTTACCAACATATTGCCAGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint8	TTTGAGCTTCAAAGCATTTTTGCGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint9	TTTGATGGCTTATTCATTCCATTATACATCTA	DNA PAINT site on stopper
Stopperpaint10	TTTTATAACAGTTAGCTATATTTATACATCTA	DNA PAINT site on stopper
Stopperpaint11	TTTCCATTAGATTCTACTAATTTTTTAGTAGTAGCCTTTATACATCTA	DNA PAINT site on stopper
Stopperpaint12	TTTTTTCATTTGGGCAAAGAATTATACATCTA	DNA PAINT site on stopper
Stopperpaint13	TTTAAATCGGTTCAACGCAAGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint14	TTTGATAAAAATCCGGAGACATTATACATCTA	DNA PAINT site on stopper
Stopperpaint15	TTTGTCAAATCAGGCTTTTGCAAATTATACATCTA	DNA PAINT site on stopper

Stopperpaint16	/5Biosg/TTTAGAGTACGCTCAACATTTTTTGTTTTAAATTTAGTTTGATTATACATCTA	DNA PAINT site on stopper
Stopperpaint17	TTCAGCTTAATCGGAAATAATATCCCTTATACATCTA	DNA PAINT site on stopper
Stopperpaint18	CGACATTCCATAGATAAGTCCTACAAAAGAATTGAGAATCGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint19	TTTATCCTAATTTACTCAACAAAGAAACCAAGTACCGCACTCATTATACATCTA	DNA PAINT site on stopper
Stopperpaint20	CTGACCTAATTATCAACGCGCCTGTTTAGAGCATGTTATACATCTA	DNA PAINT site on stopper
Stopperpaint21	TTTCCATATTTAACAACGCCAAAGGCAGAGGCATTTGATTAGTCACCCAGCTTTATACATCTA	DNA PAINT site on stopper
Stopperpaint22	TTTAGAACGCGAGGCACCTCCCGATTATACATCTA	DNA PAINT site on stopper
Stopperpaint23	TTTCTTGCGGGACCTTAAATCTTATACATCTA	DNA PAINT site on stopper
Stopperpaint24	TTTACAATTTTATACCAACGCTTATACATCTA	DNA PAINT site on stopper
Seam1	AAATTTTTGTTAAATCAGAGCAAATCGTTAAC	Seam staple to close slider
Seam2	TCGTCACTTTGCCTCATTATCAAATATGAGCCGGGTCACTCCGGGC	Seam staple to close slider
Seam3	AAATTGTTAGGAACGCCTTTTAACCAAAAACGTTAATTTCGCATT	Seam staple to close slider
Seam4	TTTATTGCAGGCGCCCCGTCGGTTT	Seam staple to close slider
Seam5	TTCATCAACGCGGTTGCGGAATAATTCGCGTCTGGAGGAAG	Seam staple to close slider
Seam6	ATCGTAACATTCTCCGTGGGAACAAGTAACAATTTCGCAC	Seam staple to close slider
Seam7	TTGTTACCTGCAGCCAGGGCATCAGATGCCGGTTTTTAAAAATTTTGCAAATATTT	Seam staple to close slider
Biotin_1	/5Biosg/TTTTTTGATAATTGCTG	Biotin site on stopper
Biotin_2	/5Biosg/TTTAAAGAAACGCAATCAATAGAATTT	Biotin site on stopper
Biotin_3	/5Biosg/TTTACGGAATAAAGCGAGTTTTGTTTATTTTCAATAGAAG	Biotin site on stopper
Biotin_4	/5Biosg/TTTAATCATAATAAAGCAAACATTATGACCC	Biotin site on stopper
Biotin_5	/5Biosg/TTTAAGCCCTTTTTACAGAAGGAAACCTTT	Biotin site on stopper
Bead_site1	TAGACTTTGGAGCCGCCACGGGAAAGGCGATTTTGCACCAAAAAAAAAAAAAAAAAAAAAA	Magnetic bead binding site on slider
Bead_site2	CCATGTTTAAACAATCGGCGAAACTACGCCAGTTGCACCAAAAAAAAAAAAAAAAAAAAAA	Magnetic bead binding site on slider
Bead_invader	TTTTTTTTTTTTTTTTTTTTGGTGC	Strand to release structure from beads
RailLink1	GTAAAGCGAGATGGAAGCCGGCGAACTTTTGCGCTATAGACTCGCG	Linker strand from rail to bind slider during folding
RailLink2	GGACTGACCGGAGCTAAACAGTTTTGCGCATAGACCCGTTG	Linker strand from rail to bind slider during folding
RailLink3	TGAAAGAGGGCTACAGAATTTTGCGCCTCGAACATTGG	Linker strand from rail to bind slider during folding
RailLink4	GAGGCAATAACCGTGCGAAACAAAGTACCCTGAGATGTTTTGCGCATCATTCAGGGC	Linker strand from rail to bind slider during folding
RailLink5	TGTGCCCTGGGAGCGGGCGCTTTTTGCGCTCGTCATAAGGC	Linker strand from rail to bind slider during folding
RailLink6	CCACAGATGTTCCTCGTTAGATTTTGCGCCAGGTCATCAGT	Linker strand from rail to bind slider during folding
RailLink7	CGGTGTACAGACACCCGCCCGTTTTGCGCCTATGAACCGTG	Linker strand from rail to bind slider during folding
RailLink8	TCATCGCACAGGAAAACGAGGCGCAGACACGTGCTAATTTTGCGCGATTTACGGCAC	Linker strand from rail to bind slider during folding
Sliderlink1 / movement link	CACGCGTGCCTGTAGAGACGCTTTTCGCGAGTCTATA	Linker strand from slider to bind rail during folding (also used for slider positioning, bridged to rail 5 of protruding addresses)
Sliderlink2	TTTAAAAAATCCCGTAAAATGTGTACATTTTCAACGGGTCTAT	Linker strand from slider to bind rail during folding
Sliderlink3	TCAGAGGTCTCCGTGGTTTTCCAATGTTCGAG	Linker strand from slider to bind rail during folding
Sliderlink4	CTCACCGGACCAGTCCTTTTGCCCTGAATGAT	Linker strand from slider to bind rail during folding
Sliderlink5 / movement link	GCCATTCATAACGCCATTTTGCCTTATGACGA	Linker strand from slider to bind rail during folding (also used for slider positioning, bridged to rail 1 of protruding addresses)
Sliderlink6	GGCGATCGGTGAGGGGGATTTTTACTGATGACCTG	Linker strand from slider to bind rail during folding
Sliderlink7	GCCAGTGCCAGTCACGACGTTGTTTTAAACCAGGCAAAGCGCGTTTTCACGGTTCATAG	Linker strand from slider to bind rail during folding
Sliderlink8	CACGTTGGTGTAGGCCTCAGGTTTTGTGCCGTAAATC	Linker strand from slider to bind rail during folding
Release_inv_1	CGCGAGTCTATAGCGC	Invader strand to release slider after closing
Release_inv_2	CAACGGGTCTATGCGC	Invader strand to release slider after closing

Release_inv_3	CCAATGTTCGAGGCGC	Invader strand to release slider after closing
Release_inv_4	GCCCTGAATGATGCGC	Invader strand to release slider after closing
Release_inv_5	GCCTTATGACGAGCGC	Invader strand to release slider after closing
Release_inv_6	ACTGATGACCTGGCGC	Invader strand to release slider after closing
Release_inv_7	CACGGTTCATAGGCGC	Invader strand to release slider after closing
Release_inv_8	GTGCCGTAAATCGCGC	Invader strand to release slider after closing
Rail_1_6 (A)	AGTACTGTCCGATTTTATAAGAATAAGTAGAAGAACT	Address linker on rail
Rail_5_5 (A)	ATACCTGGGATCTTTTATACCAAGCTGTAGCAATACT	Address linker on rail
Rail_1_10 (B)	TGCTGAGATACCTTTTCTATAGTTGATTAGTCTTTAA	Address linker on rail
Rail_5_9 (B)	TTTACCAGGAGCTTTTAGCCGATATAAGCGTAAGAAT	Address linker on rail
Rail_1_15 (C)	AGGTACGCATTCTTTTAGCGTAACATTTAGAAGTATT	Address linker on rail
Rail_5_14 (C)	AGGCCTGATATCTTTTAGTAGCATTAACTAATAGATT	Address linker on rail
Rail_1_20 (D)	CAGGTGCAATTCTTTTGACAGTGCCACCTTTTACATC	Address linker on rail
Rail_5_19 (D)	AGTTCCCGATAGTTTTACCCTGCCTTAGATTTTCAGG	Address linker on rail
Rail_1_24 (E)	GCAGCATTTCAGTTTTTAAGCCGCCTTCCCTTAGAAT	Address linker on rail
Rail_5_23 (E)	GCGACGATTTACTTTTCACAGAGCCGTGAATAACCTT	Address linker on rail
Bridge A1	TCGGACAGTACTTCGTCATAAGGCGCGC	Bridge to bind slider at site A
Bridge A5	GATCCCAGGTATTATAGACTCGCGGCGC	Bridge to bind slider at site A
Bridge B1	GGTATCTCAGCATCGTCATAAGGCGCGC	Bridge to bind slider at site B
Bridge B5	GCTCCTGGTAAATATAGACTCGCGGCGC	Bridge to bind slider at site B
Bridge C1	GAATGCGTACCTTCGTCATAAGGCGCGC	Bridge to bind slider at site C
Bridge C5	GATATCAGGCCTTATAGACTCGCGGCGC	Bridge to bind slider at site C
Bridge D1	GAATTGCACCTGTCGTCATAAGGCGCGC	Bridge to bind slider at site D
Bridge D5	CTATCGGGAACTTATAGACTCGCGGCGC	Bridge to bind slider at site D
Bridge E1	CTGAAATGCTGCTCGTCATAAGGCGCGC	Bridge to bind slider at site E
Bridge E5	GTAAATCGTCGCTATAGACTCGCGGCGC	Bridge to bind slider at site E
Invader A1	GCGCGCCTTATGACGAAGTACTGTCCGA	Invader to release slider from site A
Invader A5	GCGCCGCGAGTCTATAATACCTGGGATC	Invader to release slider from site A
Invader B1	GCGCGCCTTATGACGATGCTGAGATACC	Invader to release slider from site B
Invader B5	GCGCCGCGAGTCTATATTTACCAGGAGC	Invader to release slider from site B
Invader C1	GCGCGCCTTATGACGAAGGTACGCATTC	Invader to release slider from site C
Invader C5	GCGCCGCGAGTCTATAAGGCCTGATATC	Invader to release slider from site C
Invader D1	GCGCGCCTTATGACGACAGGTGCAATTC	Invader to release slider from site D
Invader D5	GCGCCGCGAGTCTATAAGTTCCCGATAG	Invader to release slider from site D
Invader E1	GCGCGCCTTATGACGAGCAGCATTTCAG	Invader to release slider from site E
Invader E5	GCGCCGCGAGTCTATAGCGACGATTTAC	Invader to release slider from site E

Supporting table 2. Staple strand sequences for two-pot rail structure.

Name	Sequence	Description
Core1	TTTTTTTAAAGGGCGATAAAGCACTAAATTTTTTT	Core of Rail
Core2	TTTTTTTTCAGAGAGATAACCATAATAAAGCAGCC	Core of Rail
Core3	TTTTTTTTTCTTTGCTCGTGTGCCGGTGCCCTTTTTTT	Core of Rail
Core4	TTTTTTTCAAGCAAATAACCAATCAATATTTTTTT	Core of Rail
Core5	TTTTTTTTTTGCCCCAGCAGCTCTCA	Core of Rail
Core6	CGCAGTATGTTATTTTACCCAAAAGAACAAATAAACATTTTTTT	Core of Rail
Core7	AATTGTTACCAGCGGAAAAAGAGATTTTTTT	Core of Rail
Core8	TTTTTTTCAATTTTATCCT	Core of Rail
Core9	TTTTTTTCATTTGCCGCCAAGGGTAAAGTTTTTTT	Core of Rail
Core10	TTTTTTTCATTTGGGAACGTCACCATTTTTTT	Core of Rail
Core11	TTTTTTTCCAGAATGGAAAGCGCTAAATCCTGAGTTAAGCAGCGAA	Core of Rail
Core12	TTTTTTTCAGCAGCAACC	Core of Rail
Core13	GCAAGGTGGTGCAGAGAGTGGTCCACGCTGGTTTTTTT	Core of Rail
Core14	TTTTTTTATCAAAAGAAT	Core of Rail
Core15	TAATAACGGAATTTTTTTT	Core of Rail
Core16	TTTTTTTGATGGGCGCATCTCCAACGTCTTTTTTT	Core of Rail
Core17	TTTTTTTCCCTCAGAACCGCAAGCCCAATTTTTTT	Core of Rail
Core18	TTTTTTTATTATTCTGAAAGGGTTTTGCTCATTTTTTT	Core of Rail
Core19	GGTGCCATCCCACGCATTTTTTT	Core of Rail
Core20	GTCATACATGGCTTTTGATTTTTTTT	Core of Rail
Core21	CACGGAATAAGTTTTTGCAAACGTAGAAAATACATAAGACAC	Core of Rail
Core22	TTTTTTTACTCATCGAGAACAAGTTAAACCAAGTACCGCTTTTTTT	Core of Rail
Core23	GGGAGAAAAGTCATTTTTTT	Core of Rail
Core24	TTTTTTTGTACCAGGCGGAGCCCGGAATAGGTTTTTTT	Core of Rail
Core25	CCTCAGAGCCACTTTTTTT	Core of Rail
Core26	TTTTTTTTTGTTGAAAATCTCTCCAGACTGCTTTC	Core of Rail
Core27	TTTTTTTAAGCGCCATTCGTGCGCAACTTTTTTTT	Core of Rail
Core28	ATGTAGACAGATATTTACCGCGCCCAATAGTTTTTTT	Core of Rail
Core29	TTTTTTTGATGGTTGAGGCAGAAA	Core of Rail
Core30	AAAATCACCGTTCTTTAGCGTCAGACTGTAGCGTTCATAATC	Core of Rail
Core31	TCCCGGAAAACGTACAGCGCCATTTTTTTT	Core of Rail
Core32	TTTTTTTGAGGGTAATTGAGCGAAATAGCAAACGCAA	Core of Rail
Core33	GGAGGTTTGCACCCAGCTATTTTTTT	Core of Rail
Core34	TTTTTTTGTTGGGAAGGTAACGCCATTTTTTT	Core of Rail
Core35	TTTTTTTGCCATATTATTTTAGCGAACCTTTTTTT	Core of Rail
Core36	TTTTTTTTCCCGACTTGCG	Core of Rail
Core37	AACAGTGCCCGTATAATTTTTTT	Core of Rail
Core38	TTTTTTTGAACCAGAGCCACCACCGGCCGCCAC	Core of Rail
Core39	TTTTTTTATATTTAAATAATATTTTTTTTTTT	Core of Rail
Core40	AACCTTTAGTTAATGCCCCCTGCGCCCCTCATACTATTTCGG	Core of Rail
Core41	TTTTTTTCCTGCATCAGACAGCTGTTTCAGCGGAAGCATTTTTT	Core of Rail
Core42	TTTTTTTAAAGGGCGAGACTTGAGCTTTTTTT	Core of Rail
Core43	TTTTTTTCACTGTTGCCCTATGGGTAAAGGTTTTTTTT	Core of Rail
Core44	ACAAAGTTGAAAATGAGCAAGAAACAATGCTAATATTTTTTT	Core of Rail

Core45	TTTTTTTAACATTAACTATTCATTAATTCACCC	Core of Rail
Core46	TTTTTCGCAGAAACAGCTAAATTTCTGCTTTTTT	Core of Rail
Core47	TTTTTTTGTTAAAATTTTCCTGTAGTTTTTTT	Core of Rail
Core48	TTTTTTTACAACATACGAGCCCTGGGGTCTCGA	Core of Rail
Core49	TTTTTTTGGTGGAGCCGCCACGGGA	Core of Rail
Core50	TTTTTTTTGTACTGGTAATAAGTTTGACAGGAACAGGAGTTTTTTT	Core of Rail
Core51	TTTTTTTGTTTATCCGCTTTTTTTTTTT	Core of Rail
Core52	TTTTTTTGGCCCTTATAATTTTTTT	Core of Rail
Core53	CACGTTGGTGTATTTTAACAACCCGTCGGATTCTCGATAGGT	Core of Rail
Core54	TTTTTTTATGAAACCAATCAAGTTTTTTTTTT	Core of Rail
Core55	TTTTTTTTGTATCACCGTATTAGTACCGCCATTTTTTT	Core of Rail
Core56	AGCCCGCAAAATGTTTTCCCAAGCTTTCAGATTTTTTT	Core of Rail
Core57	TTTTTTTTTTTTTTTAAAGTGTAACTGTTGCGC	Core of Rail
Core58	TTTTTTTTTATTTTGTCACCCAAAGACATTTTTTT	Core of Rail
Core59	TAAAACTGGAAGGGACTATAAGCAATTTTTTT	Core of Rail
Core60	TTTTTTTTCGGAACCCTAAAGGGAGAGAAATCGGAGAT	Core of Rail
Core61	TCACAATTTTTTCACTTCTGTA	Core of Rail
Core62	GGGGACGACGACTTTTTTT	Core of Rail
Core63	AGAAGGCAGCCGCCACGATTGAGTAAGC	Core of Rail
Core64	TGGTTCCGGCGGTTGGGTCGATCAGATGTGTGTTCAG	Core of Rail
Core65	AAATCCAGGCCCATTCCGTAAAAACCGCTTCTCGCACTCCAG	Core of Rail
Core66	CGGCAGGTGCCGAAAACCGCGTGGACGTAACCGAGTTTGA	Core of Rail
Core67	CTCAGAAAACCGCCCCATCTTCGTTTTC	Core of Rail
Core68	GGTGCGGGCCTCTTGCTGCAA	Core of Rail
Core69	TCTGGCCCGCATTAAATTTTTGTTAAATAAAAATAATTCGCG	Core of Rail
Core70	ACGGATAACCTCACCGGAAA	Core of Rail
Core71	AAAGGAGGGATAGGCGAAACAGGGTGGTTTT	Core of Rail
Core72	CGTCAGCAATGCCACGTCGGT	Core of Rail
Core73	CCGGCCATTTTTCGTCTCGTCAAACGATGCTG	Core of Rail
Core74	TGGGCGCATCCTGTCCAGT	Core of Rail
Core75	ACCGTAATGGCGTGGGATCATTGCGCACTCAATCCGCCCGCCATC	Core of Rail
Core76	AGGGTTGAGTAAAGAATCTATCAGGGCGATTTTTTTGTGCGTAT	Core of Rail
Core77	GCCTGCGGCCAAACGTGGCGAGAAAAGCATGTGCGGTCA	Core of Rail
Core78	AGTGAGATTCCACTTTTTTT	Core of Rail
Core79	CGGAACGCTGCCTGCATTGCC	Core of Rail
Core80	TTTACCGTTCCGCCTTGATTTTAAGAAAATAGTG	Core of Rail
Core81	GGCCCACTACGTGAACAGCTGGCAACCATCACCCAGCCAGCGCATAAAC	Core of Rail
Core82	CCAGCAACGCCGGCATTTCCGGCAAAGCCGCTCGACATAAAA	Core of Rail
Core83	ACCGCGGCTCACAGTTAGAGATA	Core of Rail
Core84	ATTCGTAATCAGTCGGCAGCACGCGT	Core of Rail
Core85	GGTGCTGTTCTTCGCGCGCCTG	Core of Rail
Core86	ACGGGTACAAGCCGAAGTATATAAGTGCCGTCGAGAGCACCA	Core of Rail
Core87	AGGAAGGGCGCGCAGCATCAGC	Core of Rail
Core88	CTAACGAGCCAAGACATTCGTCTTTCCATTGTCGTATAGTTA	Core of Rail
Core89	GAATCTTATTTGCCCAATCCAAATAAGAAACGATTTTCGAGC	Core of Rail
Core90	TAGCAAGCAGCACCGTCCTCAAGACTAATCAGT	Core of Rail
Core91	GCGTTTGTCCCTCAGAAGTGCGGGTCGCCGCCACC	Core of Rail

Core92	AGAATAGGTCAGGCCAGCATTTAACGCTTGAGT	Core of Rail
Core93	CAAAAGGACAAAAGAAACAGC	Core of Rail
Core94	TGAGTAAAAATAGCATCATATTCCTGATTTACGAGCTTCTGA	Core of Rail
Core95	CTAACAAAACAGTTATTAGACTTTACAATGGATAGAAAAGTT	Core of Rail
Core96	TTTACAGAAGCAGAGTCCTGAACAAGAATAAAGGAAAGGCTC	Core of Rail
Core97	CGCTGCGATCAGGTTATGGTTGCTTTGAACCGTTCCAGGAGG	Core of Rail
Core98	GAAAACACTTAGCCCAAAATCATA	Core of Rail
Core99	GGTCAGTTGTCAGAAGAGGAGCA	Core of Rail
Core100	GCGGGCCTTTCTGCGAAACCTGTCGTGCTACCGAGGCCTAATG	Core of Rail
Core101	GAAACAATTTAATCAGGCGAATTATTCACTTGCCCAAAATTA	Core of Rail
Core102	AATTCATGATACATAGAACCTACCATATACATTATAGGTTTA	Core of Rail
Core103	GTAAAAATAAAACTACAGTAACAGTACTATGCGACCAAGTTA	Core of Rail
Core104	ACGTCAGTCATTATTTCGCCTGATTGCTTTGAGATTACCTGA	Core of Rail
Core105	ATTAGAGTGAGGCGTAGAGCTTAATTGCATAGCCCGGTGTCT	Core of Rail
Core106	GGAAGTTGCGTAAGTTTGACCATTAGATTCACACGCGCGAGC	Core of Rail
Core107	CAAAATAGAACGATGAAACAAACATCAACCCAAATAATGGAA	Core of Rail
Core108	GCAAAAGCTGCTCATTTCATTTGAATTAACCTTCACTTGCTT	Core of Rail
Core109	ATAATGGTTCATCAAAAGAAATTGCGTATGGGAAGATCGGGA	Core of Rail
Core110	TGAAAAGAAATACCACAGGCA	Core of Rail
Core111	ATTATAGGCAAATCACTTCAAATATCGCAATCTAAGGTCAGG	Core of Rail
Core112	ATTACATGACAAGACAATATATGTGAGTGGACAGAAATCCTT	Core of Rail
Core113	ACAGTAACCAGGCTATTAATTAATTTTACGGTCAAAGAGTCA	Core of Rail
Core114	ATTTAATAAGACTTCACCGGAATCATAACCTCAGCCAGTATA	Core of Rail
Core115	CTGTAAAGAACTGAAGCTTAGATTAAGATCCGCGACTACCTT	Core of Rail
Core116	ATATTCACGAGCACGATCTACAAAGGCTCGTAACCGTAATCG	Core of Rail
Core117	TTTAAATGTACGCCCGGAGACAGTCAAACCTCGTTAGAGGGT	Core of Rail
Core118	TGATTAGAAATCGGGGTAATATCCAGAAAAATCATTACATTT	Core of Rail
Core119	TTATCACCCAGCAAGCTATTTTTGAAGC	Core of Rail
Core120	GCAACGGGATAAATAAACGGGTAAAATAAAATATATACACTA	Core of Rail
Core121	TATTTCACACCGAGCTGAGTAATGTGTAAAGGGATCAATATG	Core of Rail
Core122	AAGCAATTAGAAGACCTGTAATACTTTTCATCACGCATATAT	Core of Rail
Core123	TGACGCTTTTGGGGACCAGTAATAAAAGGATTTAGAATACGT	Core of Rail
Core124	ATCCAATCAATATTCAGAGCATAAAGCTTAATAACAAGCCTT	Core of Rail
Core125	AAGCCAAAACCGATCATGTAATTTAGGCATTTCTTGTAAAGT	Core of Rail
Core126	GTCAATATTACATTCAATTCTACTAATACAACAGGCAAAATT	Core of Rail
Core127	TTTTTTTATCGGCTGTCTTGTAAATGAGCATTCCACAGACACAAACT	Core of Rail
Core128	GGCACAGAAAGTACTAAAACATCGCCATGATGGCTGTCAGTA	Core of Rail
Core129	CGGAACACAAAATTATTCAACTAATGCACAATATACATAACC	Core of Rail
Core130	CCATTGGTAGTAGCTGAAATGGATTATACCTGTTCTGGCCAA	Core of Rail
Core131	GAAAGGATGAACGACCACACCCGCCGCTTTGAGAGTATAACG	Core of Rail
Core132	TAGCTCATAGTCTTATATAACAGTTGATTAGAACCGCAAATG	Core of Rail
Core133	TCTGTCGCGGGAGATCACTTGCCTGAGAAAGCCTACCGCCAG	Core of Rail
Core134	ATTGGGCTTGAATATTTTAAGAACTGGCATGAATAGAACTAA	Core of Rail
Core135	TGCTTTTCACCATTTTAGACAGGAACGGCAATGCTAAAAGAG	Core of Rail
Core136	TTCAAAGGAGAGCCTTAATTGCTCCTTTCAGCAGAAATGCTG	Core of Rail
Core137	CTGGCTGCCTTTTTTCAACGTAACAAAGAAGATGAGTAGTAA	Core of Rail
Core138	CGAGAATTATCTTTCAAAGCGGATTGCACAATCAATTCGAGC	Core of Rail

Core139	CAGAGATCCCAATTTTTGAATGGCTATACATGTTACCGAACG	Core of Rail
Core140	CCGATTAGGTAAAGATAATCAGTGAGGCACGCAAGACTTCTT	Core of Rail
Core141	CTCGTTTAGAAACCTTTTGCCAGAGGGGAATCCTTCATAAAT	Core of Rail
Core142	GTCGAAACGCTGAGATCATAAGGGAACCTCGTCGCGCATAGG	Core of Rail
Core143	AGTAGGGTTGATATTTTTTATGGAATCA	Core of Rail
Core144	GAAGGCAAGAACGCGACCCCCAGCGATTTCCGGCTAAATTGT	Core of Rail
Core145	GGCGCAGCCCTTAGTGAACGGTGTACAGCATAAATACCGGAT	Core of Rail
Core146	GCGTAACGAGACTCATTAATCTAAAGTTGAGCCTAACCAACG	Core of Rail
Core147	TCGTCACTTACTAGGGCTTTGAGGACTAGGTTTGACCACTAC	Core of Rail
Core148	ACAATGATGAGAATCAGGGAGTTAAAGGGTATCATGAGGGTA	Core of Rail
Core149	AGGACGTGATTTTCTACAGGTAGAAAGAAAGGGTTAACGCCA	Core of Rail
Core150	GAGGTGAAGAGGCACATCGCCCACGCATCGCTCAATGCGGGA	Core of Rail
Core151	ATCGGTTTATAAGAGTGCGCCG	Core of Rail
Core152	TTAACACTCCAACAAGCATCACCTTGCTCCGAAAGAACAGTT	Core of Rail
Core153	ATAGTGGCCTGATTAGGTTGGGTTATACATCTTTGAGAAAAC	Core of Rail
Core154	CCGATTGAGGGAGGAGGTGAA	Core of Rail
Core155	TTTAACCATACCAACAATCGCAAGACAACCAACCTGACCTAA	Core of Rail
Core156	CCAGTAATCAGCTGACGACAATAAACAACGCGCCT	Core of Rail
Core157	GAAAGGATCTTTACATTAGAGCCGTCAAGAATCCCGACAACT	Core of Rail
Core158	TTTTTCCGTAATGAATACCGACCGTGTCTACAGAAAAAAGCC	Core of Rail
Core159	AATTCTGCAAAAAAATTGCGAATAATAATAGATAATAGCCGA	Core of Rail
Core160	CGTATTAGTAATAGATTTTGCGGAACAAACCAGACTGATGGC	Core of Rail
Core161	TGTTTACCGCTTTCAGTAGGGCTTAATCAACAACTTTTCGAG	Core of Rail
Core162	ACGAGTAGGACATTTAGCTATATTTTCACAATCGTCATTAAC	Core of Rail
Core163	AACCACTGATAAGAACAGTGCCACGCTCGAACCAAAATATCA	Core of Rail
Core164	AGCTATTGCTTAATAAACAAGAGAATCGAGCGGGCATAATCA	Core of Rail
Core165	TTTTGCGTAAAAATTTAAATATGCAACTACAATATTCTGCGA	Core of Rail
Core166	AACCCTTCAAAAAAAGGTTATCTAAAAGACCATATACATTTG	Core of Rail
Core167	ACAACGCGGAACCCATGTACCGGGATAG	Core of Rail
Core168	AGGAAGCGAACCTCGACCGGAAGCAAACCGCCTGCAGGTCAT	Core of Rail
Core169	AGGATTGAATCGTTGCCCGAACGTTATAAAGAAGACCAGAAG	Core of Rail
Core170	TTGATACACGCCAAATATTCG	Core of Rail
Core171	ATTCATTTAGATAAAATCAAAAATCAGGATTGAGGGATTAAG	Core of Rail
Core172	GAGCGGACACTATATCCTGATTGTTTGATACCACATTTGCAC	Core of Rail
Core173	TGCACTCTGGATTGAGGAAT	Core of Rail
Core174	TTTTGCATAATTTTCGTCCAATACTGCGTAGAAGTCAGAAAA	Core of Rail
Core175	GGAAAGAACATGTTAATTGT	Core of Rail
Core176	AAACACTTAACTATAGATTTGTATCATCAATTTATGGAACGA	Core of Rail
Core177	TTTAGGAGATTATAGCATAGTAAGAGCAAATTATCGAGAGGC	Core of Rail
Core178	TGAAAGAGAATAACTCAAGAGTAATCTTTTAACAATTCAGTG	Core of Rail
Core179	ACAAAGTTGAGAGACCTGCTCCATGTTATAGCGATCCAACTT	Core of Rail
Core180	AATAAGGTTTCAATGGTTTAATTTCAACTAACGGAACCAGTC	Core of Rail
Core181	TCACTGCCCGCTCCTCCCAACGC	Core of Rail
Core182	ATTACCTCTTTTACAAAAATCTACGTTACAGAAATGTTGAGA	Core of Rail
Core183	ATTCATTAGAAAACTGACGAGAAACACCCGCGCAGATTGTGA	Core of Rail
Core184	GGTCACAACGGATGTAAATGCTGATAAAAG	Core of Rail
Core185	GGCGATTGACGTTGTATCTCCGACTTAAACGACGGGTCAT	Core of Rail

Core186	ATCGGCAGAGGCTGAGAGAAGGATTAGGATTAGCG	Core of Rail
Core187	ATGTACCGCCGGCGGAATGCG	Core of Rail
Core188	GTTTATCAAGCGGTTATTGTTTAACGTCAATTACGGAAGCGCATTAGAC	Core of Rail
Core189	TGGGATTGACGTTATCCTTAT	Core of Rail
Core190	ATCCCTTTTTTTTAACTGGTAGCGGCCAAT	Core of Rail
Core191	AAGAACGCGCCACCAAACAAAAGTCTCTGAA	Core of Rail
Core192	TTATTCATTAAGAAGGTAGCCACCCCACCCTCAT	Core of Rail
Core193	CAAATCGAACGTTTGTATTAA	Core of Rail
Core194	TTTCAGTAACACCACCAGTAGCCCTCCTTTCCATTGCTAAACAGTT	Core of Rail
Core195	GTATTCTCTTAAATCATCGTATTTCAAGATTAGTTAATCACCTTACCAT	Core of Rail
Core196	TCAGAGCCGAGGCGTTTATCCAGTTACATGGCATGCTTATTA	Core of Rail
Core197	GAAAAGCATTTAGACGCCAGTGCCAGTCACAAGTTGGGGCGATC	Core of Rail
Core198	TGAGAGTAAGTGTACAATCAT	Core of Rail
Core199	TTGGCAAGCTGCAGAACAAGAGTTGTAGAATCCTCATAA	Core of Rail
Core200	TAAATTACGCGTACCATTGCC	Core of Rail
Core201	GGTGGCAACTTCGTTGAGTATATAAAAGAAACGCAACATAAA	Core of Rail
Core202	GCCCTTATTCACAGAACCACCACCAGTTATCCG	Core of Rail
Core203	CAGCTCAACACTGGCCGGGTTTCACTGCGTCCGTGAGTTCCATG	Core of Rail
Core204	CAATCGGCGATTTGTGGAGGATCCCCGTGTGA	Core of Rail
Core205	GTGGTGAGGGATGTCGCTATTGTGTACAACAGGCG	Core of Rail
Core206	GTCATGATCCAGCGCAGTGACCTGCAAATCAAG	Core of Rail
Core207	GGCGGTTACGCCAGCTAAACTGGATCGGCG	Core of Rail
Core208	GGACTCCACTATTGTTGTTTTGATGG	Core of Rail
Core209	AACCGAGGAATAGCTATCAAATACCTTTCAACAACAGAAGGA	Core of Rail
Core210	GCCTTTAGTGATGAGCAGTTG	Core of Rail
Core211	GGGGACAAACGGCAGCACACGGCGGATTG	Core of Rail
Core212	GCGGGGAGCCCCCGCCCAAAAAAGAAAGC	Core of Rail
Core213	AGAGAACACCCTGTTTTTTTTTTGGTGGGTTGTTGGTTGTGA	Core of Rail
Core214	TTTTTTTTTTCACACTAACTCACATTTGGTGGGTTGTTGGTTGTGA	Core of Rail
Core215	AATTGCGGGCAGCTGCATTAATGGTGGGTTGTTGGTTGTGA	Core of Rail
Core216	AATAACATAAAAACCCACACATGGTGGGTTGTTGGTTGTGA	Core of Rail
Core217	**AAAAAAAAAAAAAAA**CGCCTGGCCCTGTGGTCTGGCAGCCT	Core of Rail
Core218	TCTTTTCACCA**AAAAAAAAAAAAAAA**	Core of Rail
Core219	**AAAAAAAAAAAAAAA**GTGAGACGGATTGCCCTTCAC**AAAAAAAAAAAAAAA**	Core of Rail
Biotin_1	**/5Biosg/TTT**TGGAGGTGTCGTTGCGGTATGAGCCGGGTTTCAGCTTACGGC	Biotin sites on stopper
Biotin_2	**/5Biosg/TTT**ATTGCCGTTCGGTCCGTGAGCACA	Biotin sites on stopper
Biotin_3	**/5Biosg/TTT**CCACCCTCAGAACCAATATTGACGAGGTCTCAGGGAAA	Biotin sites on stopper
Biotin_4	**/5Biosg/TTT**CATGAAAGTATTAATTTTCGGCTTATTA	Biotin sites on stopper
Biotin_5	**/5Biosg/TTT**GAGCGAGTTTAGCTTTCATCAACATTCTTTCAGGCGAAATGT	Biotin sites on stopper
Biotin_6	**/5Biosg/TTT**TTACCAGCGAATCAATAGAAAATTCGCCACTCAGAATATGGT	Biotin sites on stopper
Biotin_7	**/5Biosg/TTT**ACCAGGCATTTTAGTATCGGCCTCAGGAAGATGGTGCCGGAA	Biotin sites on stopper
Biotin_8	**/5Biosg/TTT**AGCGACAGATCGATAGGCCGGAAATTAGAGCGTCACCCATTCAA	Biotin sites on stopper
RightSidePaint1	TTTCAGCTAATGCCAACAAAT**TTATACATCTA**	DNA PAINT site on right side
RightSidePaint2	AGTAATATAAAGTACCGAGCC**TTATACATCTA**	DNA PAINT site on right side
RightSidePaint3	CTTGCGCCATATTTAACACGAT**TTATACATCTA**	DNA PAINT site on right side
RightSidePaint4	AATTTTAGTTAATTTCTTCCATTAAGGCGT**TTATACATCTA**	DNA PAINT site on right side
RightSidePaint5	TAAATAATCGGAACATGCGTTATACAAAAGG**TTATACATCTA**	DNA PAINT site on right side

RightSidePaint6	AATATCCCATCCTAAGTAGAG**TTATACATCTA**	DNA PAINT site on right side
LeftSidePaint1	TAACCGTTGTTATGACACTCA**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint2	TGAGAAGGAACCCTCAAAT**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint3	GACCTGAAATCATTCCTAATG**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint4	ATTCACCAGACATTTCCTTCT**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint5	CAGAGCGGGGAAAGGCAGAATCC**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint6	TGAATGGGGGTTTTCAGCTTG**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint7	AAACAGAGGAGTACCTAGCAG**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint8	ACGGGGAAACCGGTTGGCTAG**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint9	AACTATCGGGAATTAGAAAAA**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint10	CAAATGAAAGTTTTAATATCT**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint11	CGCGAACTGTGAATATAGATA**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint12	CGCTCATGGGTGGCATGGCAG**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint13	GGCGCTGGCCTGGAGCGCGCC**TTATACATCTA**	DNA PAINT site on left side
LeftSidePaint14	GCTACAGGGATGCCGGAGAAT**TTATACATCTA**	DNA PAINT site on left side
Rail_1ATT_1	AGGGTGAAGCTAAATAGCTGA**CGTAGGGTGAGGATTGCGTGGAGGTA**	First attachment site protrusion
Rail_1ATT_2	ATTTTTATGTTTTTATTCAAA**GCAGCGCGTGGCTTCCGCGTGAGTGG**	First attachment site protrusion
Rail_1ATT_3	AAAAACATAGCAATGATAAAA**CGACATCGACGCATCCCGTAGGTGAT**	First attachment site protrusion
Rail_1ATT_4	AGGCAAACCTTGCTTTGTACC**CGAGGCGTCCTCGGCACGTAGGGTGA**	First attachment site protrusion
Rail_2ATT_1	AAGAGGCGCAAATCGCGCGAA**GCAGCAACGCCACAGCGCAGGGTAGT**	Second attachment site protrusion
Rail_2ATT_2	AGGAAGTATCTTCTAAAACGA**GGCCTCCGCAGACGCACGATGGTAGG**	Second attachment site protrusion
Rail_2ATT_3	GACAGCAGAATAAATTTCATG**GCCGTGCGACCTGCGACGTGAGTTAG**	Second attachment site protrusion
Rail_2ATT_4	GTCGCTGTTCTTACAGCGAAA**GCCATCCATTGCGTGCGCGAGTGAGT**	Second attachment site protrusion
Rail_3ATT_1	TGCTTTACTAATAGCCTGACT**CGTTACCCGCTACGTGCGAGGGTTAG**	Third attachment site protrusion
Rail_3ATT_2	TTTAGACACAATTCCCTCAAA**GCAGAACTCTGGCCGACGTTTAGGGT**	Third attachment site protrusion
Rail_3ATT_3	AAAACCACATTATCTAAAATG**CGATGGCGTGCCAGTCGCAGTTGAGT**	Third attachment site protrusion
Rail_3ATT_4	AAAGGAATATCAGAGACGATA**GTGGAAATGCGAGCTGGCAGTGAGGT**	Third attachment site protrusion
Invader_1ATT_1	TTTACCTCTACCTCCACGCAATCCTCACCCTACGAGCTTAAT	Invader to release slider from first attachment site
Invader_1ATT_2	GCCACCTCATCACCTACGGGATGCGTCGATGTCGCGTCATAA	Invader to release slider from first attachment site
Invader_1ATT_3	ACCTCCATCCACTCACGCGGAAGCCACGCGCTGCACGGATTT	Invader to release slider from first attachment site
Invader_1ATT_4	TTTCACTTTCACCCTACGTGCCGAGGACGCCTCGCTATATCG	Invader to release slider from first attachment site
Invader_2ATT_1	GCCCTACCACTCACTCGCGCACGCAATGGATGGCAGTCTTCG	Invader to release slider from second attachment site
Invader_2ATT_2	AAACCTCCACTACCCTGCGCTGTGGCGTTGCTGCACGGTTCA	Invader to release slider from second attachment site
Invader_2ATT_3	CCTCACTCCTAACTCACGTCGCAGGTCGCACGGCCTAGAAAC	Invader to release slider from second attachment site
Invader_2ATT_4	CCTCCATCCCTACCATCGTGCGTCTGCGGAGGCCTATGGCGG	Invader to release slider from second attachment site
Invader_3ATT_1	CTCTCAACCTAACCCTCGCACGTAGCGGGTAACGACATGCAT	Invader to release slider from third attachment site
Invader_3ATT_2	CCTCTATCACCCTAAACGTCGGCCAGAGTTCTGCAGTTGATG	Invader to release slider from third attachment site
Invader_3ATT_3	GCCCTACAACTCAACTGCGACTGGCACGCCATCGCGTACTTA	Invader to release slider from third attachment site
Invader_3ATT_4	TCAACCTCACCTCACTGCCAGCTCGCATTTCCACTCGTTTAA	Invader to release slider from third attachment site
Anti-Invader_1ATT_1.1	ATTAAGCTCGTAGGG	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_1.2	GATTGCGTGGAGGTAGAGGTAAA	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_2.1	TTATGACGCGACATC	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_2.2	CATCCCGTAGGTGATGAGGTGGC	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_3.1	AAATCCGTGCAGCGC	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_3.2	CTTCCGCGTGAGTGGATGGAGGT	Anti-Invader to unblock first attachment site

Anti-Invader_1ATT_4.1	CGATATAGCGAGGCG	Anti-Invader to unblock first attachment site
Anti-Invader_1ATT_4.2	CGGCACGTAGGGTGAAAGTGAAA	Anti-Invader to unblock first attachment site
Anti-Invader_2ATT_1.1	CGAAGACTGCCATCC	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_1.2	CGTGCGCGAGTGAGTGGTAGGGC	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_2.1	TGAACCGTGCAGCAA	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_2.2	ACAGCGCAGGGTAGTGGAGGTTT	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_3.1	GTTTCTAGGCCGTGC	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_3.2	TGCGACGTGAGTTAGGAGTGAGG	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_4.1	CCGCCATAGGCCTCC	Anti-Invader to unblock second attachment site
Anti-Invader_2ATT_4.2	ACGCACGATGGTAGGGATGGAGG	Anti-Invader to unblock second attachment site
Anti-Invader_3ATT_1.1	ATGCATGTCGTTACC	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_1.2	ACGTGCGAGGGTTAGGTTGAGAG	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_2.1	CATCAACTGCAGAAC	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_2.2	GCCGACGTTTAGGGTGATAGAGG	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_3.1	TAAGTACGCGATGGC	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_3.2	CAGTCGCAGTTGAGTTGTAGGGC	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_4.1	TTAAACGAGTGGAAA	Anti-Invader to unblock third attachment site
Anti-Invader_3ATT_4.2	AGCTGGCAGTGAGGTGAGGTTGA	Anti-Invader to unblock third attachment site

Supporting table 3. Staple strands for two-pot device slider

Name	Sequence	Description
Core1	TTTTTTTTCGGGGCGAATCTTTTACTTTTTTT	Core of Slider
Core2	TTTTTTTAAGCCCGTCAGGGCGCGTCATTGTAC	Core of Slider
Core3	TTTTTTTAGGCTCCGCGGCGTTTCCTTTTTTT	Core of Slider
Core4	TTTTTTTCCCTGGAAGTGGCGCTTTTTTTTTT	Core of Slider
Core5	TTTTTTTATAAAATTGTAAACGTTAACAATAGG	Core of Slider
Core6	TTTTTTTCATGATCCCCCATGTTGTGCAAAAAAGCGG	Core of Slider
Core7	TTTTTTTGTAACTATCGTCT	Core of Slider
Core8	TTTTTTTAATAGTGTATGCGGCGACCAAGTCATTCTGAGTTTTTTT	Core of Slider
Core9	TTTTTTTAGGGCGCTGGCA	Core of Slider
Core10	TTTTTTTGCTACAGAGTTCT	Core of Slider
Core11	TTTTTTTCTCTCAAAATCA	Core of Slider
Core12	TTTTTTTTTTGACGTATGC	Core of Slider
Core13	GTTTGCACACCGCTTCTGCGCTCTGCTGGCCTAACTACG	Core of Slider
Core14	GCGGATGTTTCGGTGATGACGAAAAATA	Core of Slider
Core15	AACCAGCATACCGCGAGACCCCCCGTCG	Core of Slider
Core16	CACATGCAGCCCGCCCACACTCCCGGAGACGGTCACCTCTGA	Core of Slider
Core17	ACCGTATCAGCAGGAAAGAAGTGCGGT	Core of Slider
Core18	GGCGTATTTTCCCCGAAAAGTGTATTTA	Core of Slider
Core19	GGCATCGTGGTGCTCCGGTTCC	Core of Slider
Core20	GATCCAGTTAGGCCGCAAACGATGTAACCAAAA	Core of Slider
Core21	GCGGTTCCAGCCGGCGGTTTTTTTCGCTC	Core of Slider
Core22	AACTACGTGCAATGCAGCCGGTATCCGCCTCCATCAAGTAGTTCGC	Core of Slider
Core23	ACGCTCAATTTATCTTAATTGTTCAGTAAAGGAGCCGGG	Core of Slider
Core24	TGTAGATCGATCTGTCTATTTTATATGA	Core of Slider
Core25	TGCCCGACTACGATGCAAAAAAGTTATT	Core of Slider
Core26	TAACAGGATTACCGGTAAGACA	Core of Slider
Core27	CAAGGATCTTACCGTGCACCC	Core of Slider
Core28	ACGAGCATCACAAAGACAGGACTATAAAGTGCGCT	Core of Slider
Core29	GCTCAAGTCTAATACGGGAAGAG	Core of Slider
Core30	AACTGATGGGTGAGCAAAAACGGGCGACACGGAAATTATTGA	Core of Slider
Core31	CTACGTGAATTTGTAAATTCCATCACCCAAATCAATGGCCCA	Core of Slider
Core32	GTAACCACGCGCTTAATGCGCCACAGAT	Core of Slider
Core33	GCGTAAGCGCATCAGTATTAACCCTAAA	Core of Slider
Core34	TTTTTTTTTTCACCAGTACTCATAC**GGTGTGGGTGTTTGTGGT**	Core of Slider
Core35	TTTTTTTTCTTCCTTTAAACAAATAGGG**GGTGTGGGTGTTTGTGGT**	Core of Slider
Core36	TTTTTTTTGGTGACTATAATAACTAATTGCGGCGTGTAC**GGTGTGGGTGTTTGTGGT**	Core of Slider
Core37	TTTTTTTAGAAATCTTCGCCAGAACGTTCTGGGAAG**GGTGTGGGTGTTTGTGGT**	Core of Slider
Core38	TTCACAGTGGACTCGCTCCCTGATTTAT	Core of Slider
Core39	AGCATTTTTTGAATGCCACCTAACCTATGTGAAAACAGCTTGGTTGGCG	Core of Slider
Core40	TCGTTTGGCAGCCACTGGTATG	Core of Slider
Core41	CACCCCGCCCGAACTTAGGTCCCTCTTAGCCGGCCAAAAGGC	Core of Slider
Core42	CTCAGTTGCCCGACCGCTGCGCCTTATCCGTTTTTTT	Core of Slider
Core43	GAATAGCTAACCAACACGAAAAATACCGCGCTACACGGTCACGGAAGAA	Core of Slider
Core44	GGGAAAGCCGGCTTGGGCTGGCGAACGTGGCGAGACTTGACG	Core of Slider

Core45	ACAGCGATGATGACTCGCCCTAGGAGGTCATGTGAAGCAAAA	Core of Slider
Core46	TTGTCAGATTAGCTCCTTCGGTCCGGCTGAGCTGTCCGATCG	Core of Slider
Core47	GGTGTCGAACTATGCGGCATCTTAAAATTCGCGTTTAAATCA	Core of Slider
Core48	GTCTATGAGGACGCCATGAGCGGATACATAATCAGGGGGAATAA	Core of Slider
Core49	TCTACGGTAAGGGATTTTGGTTCCTTTT	Core of Slider
Core50	AAGAAACCAAATACGAGAATTATTATCATGACATTGACGTCT	Core of Slider
Core51	AACAAACAGCAGCAGATTACGGATCTTT	Core of Slider
Core52	AGGTGCCAAAAACCGTCTATCCCACTAT	Core of Slider
Core53	GAAAAATTTCAATATGTTGAACGTTTCTCTTCAGC	Core of Slider
Core54	AGCGAAAAAGGGAGCCCCCGAGGGGTCG	Core of Slider
Core55	CTCCTGTCCTTTCTCCCTT	Core of Slider
Core56	GCCGCTTGTAAGCATCCACCGGAT	Core of Slider
Core57	TTTTTTTACTCATGGTTATGG	Core of Slider
Core58	GGTCGTTCGCTCCATGTGCACGAACCCCCCGTTCACGGTGTA	Core of Slider
Core59	TTTTTTTCTCATAGCTCACGCTGTAGGTAT	Core of Slider
Core60	GCCCGGCTCTGTGACTGGTGAATAATTCTCTTA	Core of Slider
Core61	AGTAAGTTGGCCGCAGTGTTATCTTTTTTT	Core of Slider
Hinge1	AGGAAGGCCACTCGCTGTTGATTTACATAGCAGAACTTTGCTCTT	Hinge of slider
Hinge2	AAACTCTTTTGCTCATCATTGGAAAATTTTTTT	Hinge of slider
Hinge3	CCCCCTGTTTCGCGTTGCTGGCGTTTTTTTTTT	Hinge of slider
Hinge4	GTGGCGAAACCCAATCGACTTTGGCCAGGA	Hinge of slider
Slider_paint1	GGTGTGATCATGAATACCTTGTCGTG**TTATCTACATA**	DNA PAINT site on slider
Slider_paint2	AGTGTAGGGGCGCGTACTATGGTTGC**TTATCTACATA**	DNA PAINT site on slider
Slider_paint3	TGAGAGTGCACC**TTATCTACATA**	DNA PAINT site on slider
Slider_paint4	TTTTTTTTCGTCTCGCGCGCCGGGAGCAGAC**TTATCTACATA**	DNA PAINT site on slider
Slider_paint5	TTTTTTTGTTCCGCGCACACACGAGGCCCTT**TTATCTACATA**	DNA PAINT site on slider
Slider_paint6	TTTTTTTCGTCAAAGGGCGGTAAAGCACTAA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint7	TTTTTTTATCGGAACCCTAGGAGCGGGCGCT**TTATCTACATA**	DNA PAINT site on slider
Slider_paint8	CCGAAATCGGCA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint9	TTTTTTTAGTGGTCCTTTTGCGCAA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint10	TTTTTTTCATCTGGCCCCAGTGCATACGGGAGGGCTTAC**TTATCTACATA**	DNA PAINT site on slider
Slider_paint11	TTTTTTTAATCAGTGAGGCACCTACAGTTACCAATGC**TTATCTACATA**	DNA PAINT site on slider
Slider_paint12	TTTTTTTCGTTGTTGCGGCGAGTTA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint13	TTACCTTCGGAAAAAG**TTATCTACATA**	DNA PAINT site on slider
Slider_paint14	TTTTTTTCTCAAGAAGTTATCAAAA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint15	TTTTTTTAGTTGGTAGAAAAAGGA**TTATCTACATA**	DNA PAINT site on slider
Slider_paint16	GTATGTAGGCGG**TTATCTACATA**	DNA PAINT site on slider
Slider_1ATT_1	**CGCAATCCTCACCCTACG**TGAGTCCAACGCAGAGCGAG	First attachment site protrusion
Slider_1ATT_2	**GCGGAAGCCACGCGCTGC**CGACTTATCGCAGCCACTGG	First attachment site protrusion
Slider_1ATT_3	**CGGGATGCGTCGATGTCG**GCTTCATTCAGTCACGCTCG	First attachment site protrusion
Slider_1ATT_4	**CGTGCCGAGGACGCCTCG**CAACGATCAACATTGCTACA	First attachment site protrusion
Slider_2ATT_1	**GCGCTGTGGCGTTGCTGC**TGAAGTGGTGAAGCCAGTCCGGCA	Second attachment site protrusion
Slider_2ATT_2	**CGTGCGTCTGCGGAGGCC**GCTACACTAGTTTGGTAGGTA	Second attachment site protrusion
Slider_2ATT_3	**CGTCGCAGGTCGCACGGC**AAGCTAGAGTCAGTCTAAGCAATA	Second attachment site protrusion
Slider_2ATT_4	**GCGCACGCAATGGATGGC**CAGTTAATAGGCAACTTAAGGGCCGAGCGCAGATTTTTTT	Second attachment site protrusion
Slider_3ATT_1	**CGCACGTAGCGGGTAACG**CGGGAAGCGCTCCCTCGATACCA	Third attachment site protrusion
Slider_3ATT_2	**CGTCGGCCAGAGTTCTGC**ACCTGTCCGTCCGACCCT	Third attachment site protrusion

Slider_3ATT_3	**GCGACTGGCACGCCATCG**CTGTCATGCATGCTTTGTCAATACCGCGCC	Third attachment site protrusion
Slider_3ATT_4	**GCCAGCTCGCATTTCCAC**CAGCACTGCGTACTCAACCGAGTTAAAAGT	Third attachment site protrusion
Close1	AAATTAACAAGAGTAGGGCGAGTTTTTTTTTAGAGAAGGAAGGCTGCGC	Closing staple, add after assembly and loading
Close2	TTTTTTTAGGATCTTCCGTGGACTCCAATTTTTTT	Closing staple, add after assembly and loading
Close3	TTTTTTTAAATCCCTTATAAATCAAATGGTCTGATCTCAG	Closing staple, add after assembly and loading
Close4	TAAAGAAACCTAGACATGAGAATCCTTTCGCAGAACTCTTGA	Closing staple, add after assembly and loading
Close5	GTAAACTAGAATAGTTTTAACTATTTTGAGAGCAGAGCGGGTTCTGTAA	Closing staple, add after assembly and loading
Close6	AGTGGTTGCCCATAGAACGAAAAGTTTTAAATCAATCGAGTGTT	Closing staple, add after assembly and loading
Close7	GCTCATTCCCGAGATAGGGTTTAAAGTACGTTCATCTGACTC	Closing staple, add after assembly and loading
Close8	GTTCCAGTTTGGAAAAATGAACTCACGTGGTCTGA	Closing staple, add after assembly and loading

Supporting table 4. Sample sizes for figures in main text.

DESCRIPTION	N
FIGURE 2D LEFT (FREE ONE-POT DEVICE)	150
FIGURE 2D RIGHT (FREE TWO-POT DEVICE)	62
FIGURE 3D PANEL 1 (ONE-POT IN POSITION A)	79
FIGURE 3D PANEL 2 (ONE-POT IN POSITION B)	71
FIGURE 3D PANEL 3 (ONE-POT IN POSITION C)	164
FIGURE 3D PANEL 4 (ONE-POT IN POSITION D)	115
FIGURE 3D PANEL 5 (ONE-POT IN POSITION E)	89
FIGURE 3D PANEL 6 (TWO-POT IN POSITION 1)	105
FIGURE 3D PANEL 7 (TWO-POT IN POSITION 3 (MIDDLE))	51
FIGURE 3D PANEL 8 (TWO-POT IN POSITION 2)	67
FIGURE 3E TOP (RELEASED ONE-POT DEVICE)	81
FIGURE 3E BOTTOM (RELEASED TWO-POT DEVICE)	29