[1]Kinetically Controlled Self-Assembly of DNA Oligomers

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Supporting Information

DNA sequence design

DNA sequences were designed using the program NANEV[1] which employs an evolutionary algorithm to optimize a set of DNA sequences. Sequences are shown in Table S-1. DNA oligonucleotides were purchased from IDT, Inc. (Coralville, Iowa, USA). Sequences are written 5´... 3´.

Seed	
S	ACTGGAACTAGTTGATGAAGCTG
Monomer 1	
L1	**GTGTGCGTATTATGTC**TCCTCCT**CAGCTTCATCAACTAGTTCCAGT**
C1	CTAGTTGATGAAGCTGGACATAATACGCACAC
Monomer 2	
L2	AGGAGGAGACATAATACGCACACACTGGAACTAGTTGATGAAGCTG
C2	**CAGCTTCATCAACTAGGTGTGCGTATTATGTC**
Rubbish Collectors	
R1	**TGCGTATTATGTCCAGCTT**
R2	GCACACCTAGTTGATGAAG

Table S-1. DNA sequences. Font colors correspond to line colors used in Scheme 1 in the main text: bold font corresponds to full lines, normal font corresponds to dashed lines.

Control experiments

Figure S-1 below shows the components of the system separately on a gel. In particular the gel shows that the two monomers are virtually non-reactive when mixed (lane 8) and that the two waste complexes run to almost the same position (lanes 11, 12).

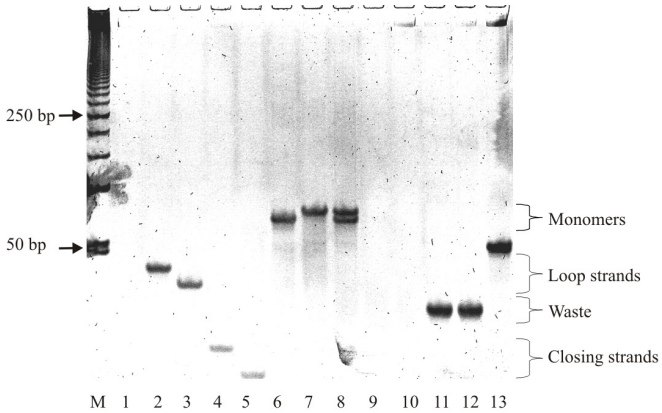

Figure S-1. System components. 15% non-denaturing polyacrylamide gel containing system components, including monomers and waste complexes. Lane M: 50 base-pair ladder. Lane 1: seed strand S (run off the gel). Lane 2: loop strand L1. Lane 3: loop strand L2. Lane 4: closing strand C1. Lane 5: closing strand C2. Lane 6: monomer M1. Lane 7: monomer M2. Lane 8: a mixture of monomers M1 and M2 which have been annealed separately. Lane 9: rubbish collector R1 (run off the gel). Lane 10: rubbish collector R2 (run off the gel). Lane 11 waste complex W1. Lane 12 waste complex W2. Lane 13: loop strand L1 + seed strand S.

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To compare kinetically controlled assembly with equilibrium assembly, the system was annealed. Reaction mixtures were placed in a beaker of water at 95°C for 5 minutes and then allowed to cool to room temperature over approximately 12 hours. The gel in Figure S-2 compares the annealing products of loop strands (Panel A) and the full system of monomers and rubbish collectors (Panel B) with different amounts of seed. In lanes containing seed, both gels show a ladder of bands corresponding to oligomers, similar to those seen in Figure 1 in the main text; these bands increase in concentration as the seed concentration increases. The strongest bands in the absence of seed, that are visible in all lanes, are not formed during the non-equilibrium assembly reaction for any seed concentration (Figure 1): we attribute these bands to the formation of stable rings[2].

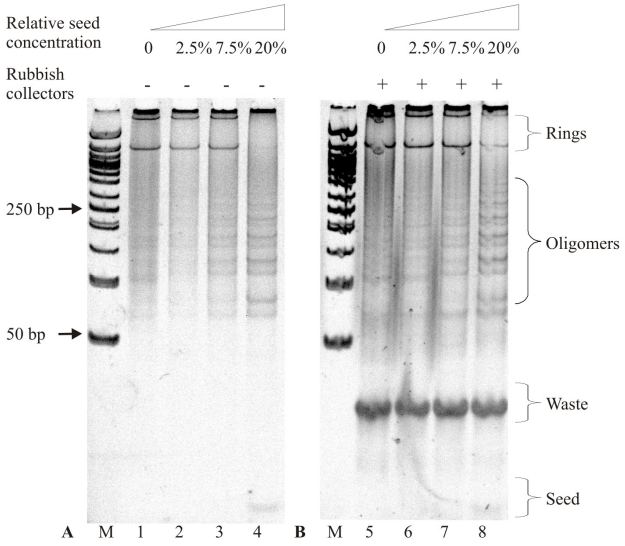

Figure S-2. Products of annealing system components. 15% non-denaturing polyacrylamide gel showing the products of annealing part or all of the system components. A) Loop strands L1, L2 and B) monomers M1, M2 and rubbish collectors R1, R2, with different amounts of seed S, as indicated. Concentrations of loop, closing and rubbish collector strands were the same as in experiments on kinetically controlled self-assembly. Lanes M contain a 50 bp DNA ladder.

References

[1] R. P. Goodman, *Biotechniques* **2005**, *38*, 548.

[2] T. E. Cloutier, J. Widom, *Proc. Natl. Acad. Sci. U. S. A.* **2005**, 102, 3645.