

Electronic Supplementary Information

Structural stability of DNA origami nanostructures in the presence of chaotropic agents

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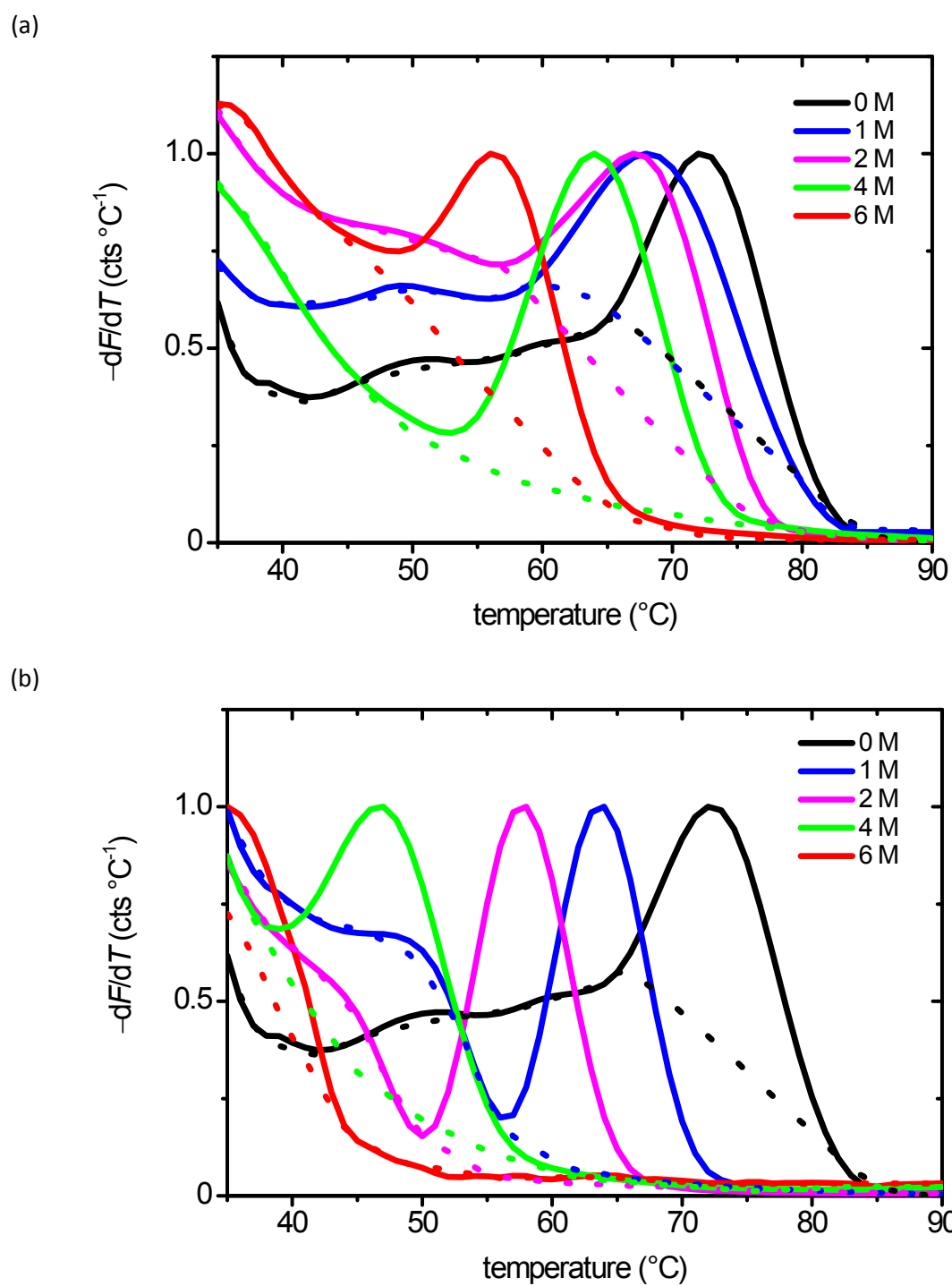


Figure S1: Melting curves without baseline subtraction in different concentrations of urea (a) and GdmCl (b). Dashed lines represent the baselines that have been subtracted in Fig. 1.

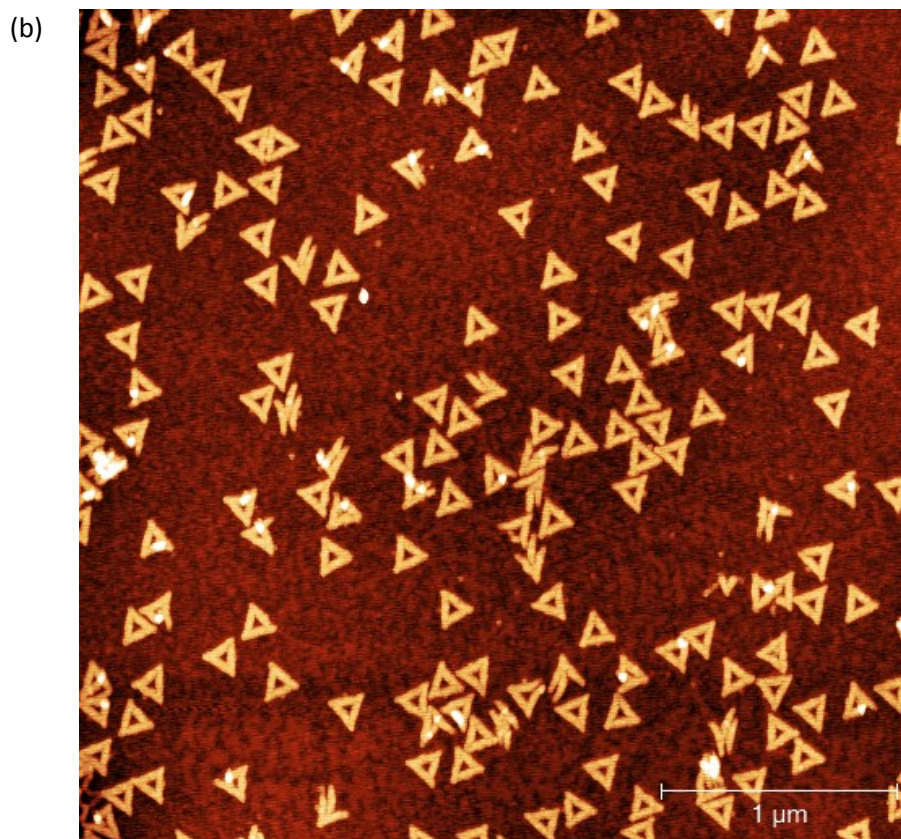
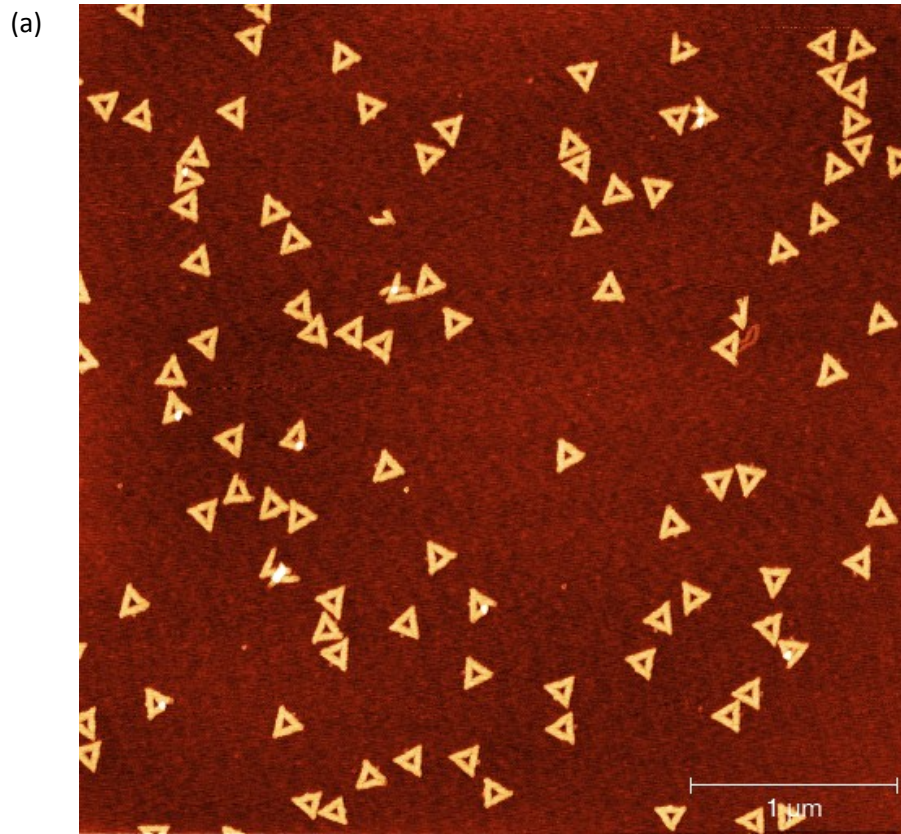


Figure S2: AFM images of DNA origami after 24 h incubation in 6 M urea (a) and 6 M GdmCl (b) at 23°C.

Table S1: List of staple sequences and corresponding melting temperatures T_m .

<i>Trapezoids</i>		
Rothemund's notation	Sequence	T_m (°C)
t1s18h,D1,	AATACTGCGGAATCGTAGGGGTAATAGTAAAATGTTTAGACT	73.8
t1s28h,E1,	TCTTTGATTAGTAATAGTCTGTCCATCACGCAAATTAACCGTT	68.5
t1s8h,F1,	CAGAAGGAAACCGAGGTTTTTAAGAAAAGTAAGCAGATAGCCG	71.6
t1s10g,B2,	GACGGGAGAATTAAGTAACTCGGAATAAGTTTATTTCCAGCGCC	69.2
t1s12i,C2,	TCATATGTGTAATCGTAAAAGTATGTCATTTTC	60.8
t1s14i,D2,	GTGAGAAAATGTGTAGGTAAAGATACAACTTT	57.3
t1s16i,E2,	GGCATCAAATTTGGGGCGCGAGCTAGTTAAAG	72.7
t1s18i,F2,	TTCGAGCTAAGACTTCAAATATCGGGAACGAG	74.7
t1s20g,G2,	GAATACCACATTCAACTTAAGAGGAAGCCCGATCAAAGCG	61.4
t1s22i,H2,	TCGGGAGATATACAGTAACAGTACAAATAATT	58.7
t1s24i,A3,	CCTGATTAAAGGAGCGGAATTATCTCGGCCTC	63.6
t1s26i,B3,	GCAAATCACCTCAATCAATATCTGCAGGTCGA	55.8
t1s28i,C3,	CGACCAGTACATTGGCAGATTCACCTGATTGC	62.2
t1s2i,D3,	CGGGGTTTCTCAAGAGAAGGATTTTGAATTA	82.5
t1s30g,E3,	TTGACGAGCACGTATACTGAAATGGATTATTTAATAAAAAG	76.5
t1s4i,F3,	AGCGTCATGTCTCTGAATTTACCGACTACCTT	51.3
t1s6i,G3,	TTCATAATCCCCTTATTAGCGTTTTTCTTACC	50.3
t1s8i,H3,	ATGGTTTATGTCACAATCAATAGATATTAAC	62.6
t2s11g,A4,	AGAAAAGCCCCAAAAAGAGTCTGGAGCAAACAATCACCAT	57.1
t2s13g,B4,	ACAGTCAAAGAGAATCGATGAACGACCCCGTTGATAATC	72.0
t2s15f,C4,	ATAGTAGTATGCAATGCCTGAGTAGCCGGAG	73.2
t2s17f,D4,	AACCAGACGTTTAGCTATATTTTCTTACTA	52.4
t2s1g,E4,	GATAAGTGCCGTCGAGCTGAAACATGAAAGTATACAGGAG	61.0
t2s21g,F4,	CCTGATTGCTTTGAATTGCGTAGATTTTCAGGCATCAATA	65.0
t2s23g,G4,	TGGCAATTTTTAACGTCAGATGAAAACAATAACGGATTGCG	66.3
t2s25f,H4,	AAGGAATTACAAAGAAACCACCAGTCAGATGA	59.4
t2s27f,A5,	GGACATTCACCTCAAATATCAAACACAGTTGA	61.5
t2s3g,B5,	TTTGATGATTAAGAGGCTGAGACTTGCTCAGTACCAGGCG	73.4
t2s5f,C5,	CCGGAACCCAGAATGGAAAGCGCAACATGGCT	71.6
t2s7f,D5,	AAAGACAACATTTTCGGTCATAGCCAAAATCA	60.0
t3s10g,E5,	GTCAGAGGGTAATTGATGGCAACATATAAAAGCGATTGAG	85.7
t3s14e,F5,	CAATATGACCCTCATATATTTTAAAGCATTAA	71.1
t3s16e,G5,	CATCCAATAAATGGTCAATAACCTCGGAAGCA	63.4
t3s18g,H5,	AACTCCAAGATTGCATCAAAAAGATAATGCAGATACATAA	69.7
t3s20g,A6,	CGCCAAAAGGAATTACAGTCAGAAGCAAAGCGCAGGTCAG	67.2
t3s24e,B6,	TAATCCTGATTATCATTTTGGCGAGAGGAAGG	63.3
t3s26e,C6,	TTATCTAAAGCATCACCTTGCTGATGGCCAAC	68.2
t3s28g,D6,	AGAGATAGTTTGACGCTCAATCGTACGTGCTTTTCTCGTT	70.1
t3s30g,E6,	AGAATCAGAGCGGGAGATGGAAATACCTACATAACCCCTTC	65.5

t3s4e,F6,	TGTA CTGGAAATCCTCATTAAAGCAGAGCCAC	58.9
t3s6e,G6,	CACCGGAAAGCGCGTTTTTCATCGGAAGGGCGA	76.3
t3s8g,H6,	CATTCAACAAACGCAAAGACACCAGAACACCCTGAACAAA	53.5
t4s11g,A7,	GCAAATATTTAAATTGAGATCTACAAAGGCTACTGATAAA	66.6
t4s13g,B7,	CGTTC TAGTCAGGTCATTGCCTGACAGGAAGATTGTATAA	78.7
t4s15f,C7,	CAGGCAAGATAAAAAATTTTTAGAAATATTCAAC	69.1
t4s17f,D7,	GATTAGAGATTAGATACATTTTCGCAAATCATA	60.1
t4s1g,E7,	TAGCCCGGAATAGGTGAATGCCCCCTGCCTATGGTCAGTG	68.6
t4s21g,F7,	GCGCAGAGGCGAATTAATTATTTGCACGTA AATTCTGAAT	75.7
t4s23g,G7,	GATTATACACAGAAATAAAGAAATACCAAGTTACAAAATC	53.3
t4s25f,H7,	TAGGAGCATAAAAGTTTGAGTAACATTGTTTG	64.5
t4s27f,A8,	TGACCTGACAAATGAAAAATCTAAAATATCTT	45.8
t4s3g,B8,	TTTAACGGTTCGGAACCTATTATTAGGGTTGATATAAGTA	75.8
t4s5f,C8,	CTCAGAGCATATTCACAAACAAATTAATAAGT	51.2
t4s7f,D8,	GGAGGGAATTTAGCGTCAGACTGTCCGCCTCC	66.1
t5s10g,E8,	GATAACCCACAAGAATGTTAGCAAACGTAGAAAATTATTC	71.0
t5s14e,F8,	TTAATGCCTTATTTCAACGCAAGGGCAAAGAA	68.3
t5s16e,G8,	TTAGCAAATAGATTTAGTTTGACCAGTACCTT	64.9
t5s18g,H8,	TAATTGCTTTACCCTGACTATTATGAGGCATAGTAAGAGC	66.1
t5s20g,A9,	AACACTATCATAACCCATCAAAAATCAGGTCTCCTTTTGA	66.3
t5s24e,B9,	AATGGAAGCGAACGTTATTAATTTCTAACAAC	57.1
t5s26e,C9,	TAATAGATCGCTGAGAGCCAGCAGAAGCGTAA	69.7
t5s28g,D9,	GAATACGTAACAGGAAAAACGCTCCTAAACAGGAGGCCGA	66.0
t5s30g,E9,	TTAAAGGGATTTTAGATACCGCCAGCCATTGCGGCACAGA	81.3
t5s4e,F9,	CCTTGAGTCAGACGATTGGCCTTGCGCCACCC	76.5
t5s6e,G9,	TCAGAACCCAGAATCAAGTTTGCCGGTAAATA	55.3
t5s8g,H9,	TTGACGGAAATACATACATAAAGGGCGCTAATATCAGAGA	53.3
t6s15g,B10,	ATAAAGCCTTTGCGGGAGAAGCCTGGAGAGGGTAG	75.3
t6s17f,C10,	TAAGAGGTCAATTCTGCGAACGAGATTAAGCA	61.5
t6s25g,E10,	TCAATAGATATTAATCCTTTGCCGGTTAGAACCT	68.5
t6s27f,F10,	CAATATTTGCCTGCAACAGTGCCATAGAGCCG	64.5
t6s5g,H10,	CAGAGCCAGGAGGTTGAGGCAGGTAACAGTGCCCCG	71.2
t6s7f,A11,	ATTAAAGGCCGTAATCAGTAGCGAGCCACCCT	59.3
t7s10g,B11,	ATAAGAGCAAGAAACATGGCATGATTAAGACTCCGACTTG	60.1
t7s14e,C11,	ATGACCCTGTAATACTTCAGAGCA	51.0
t7s16e,D11,	TAAAGCTATATAACAGTTGATTCCCATTTTTG	51.4
t7s18g,E11,	CGGATGGCACGAGAATGACCATAATCGTTTACCAGACGAC	74.5
t7s20g,F11,	GATAAAAACCAAAATATTA AACAGTTCAGAAATTAGAGCT	58.9
t7s24e,G11,	ACAATTCGACA ACTCGTAATACAT	55.3
t7s26e,H11,	TTGAGGATGGTCAGTATTAACACCTTGAATGG	64.3
t7s28g,A12,	CTATTAGTATATCCAGAACAATATCAGGAACGGTACGCCA	72.2
t7s30g,B12,	GAATCCTGAGAAGTGTATCGGCCTTGCTGGTACTTTAATG	71.6
t7s4e,C12,	GCCGCCAGCATTGACACCACCCTC	48.5

t7s6e,D12,	AGAGCCGCACCATCGATAGCAGCATGAATTAT	60.1
t7s8g,E12,	CACCGTCACCTTATTACGCAGTATTGAGTTAAGCCCAATA	68.0
t8s17g,G12,	TAATTGCTTGGAAGTTTCATTCCAAATCGGTTGTA	73.3
t8s27g,A1,	CGCGAACTAAAACAGAGGTTGAGGCTTAGAAGTATT	65.9
t8s7g,C1,	AGCCATTTAAACGTCACCAATGAACACCAGAACCA	53.0
t9s10h,D1,	TATCTTACCGAAGCCCAAACGCAATAATAACGAAAATCACCAG	57.2
t9s16e,E1,	ACTAAAGTACGGTGTGCAATATAA	56.2
t9s18g,F1,	TGCTGTAGATCCCCCTCAAATGCTGCGAGAGGCTTTTGCA	70.4
t9s20h,G1,	AAAGAAGTTTTGCCAGCATAAATATTCATTGACTCAACATGTT	73.3
t9s26e,H1,	ACCACCAGCAGAAGATGATAGCCC	46.1
t9s28g,A2,	TAAAACATTAGAAGAAGCTCAAACCTTTTTATAATCAGTGAG	70.9
t9s30h,B2,	GCCACCGAGTAAAAGAACATCACTTGCTGAGCGCCATTAATA	64.6
t9s6e,C2,	CCATTAGCAAGGCCGGGGGAATTA	51.7
t9s8g,D2,	GAGCCAGCGAATACCCAAAAGAACATGAAATAGCAATAGC	55.6
t-10s17h,E2,	ACCAACCTAAAAAATCAACGTAACAAATAAATTGGGCTTGAGA	57.7
t-10s27h,F2,	AACTCACATTATTGAGTGTTGTTCCAGAAACCGTCTATCAGGG	74.5
t-10s7h,G2,	ACGACAATAAATCCCGACTTGCGGGAGATCCTGAATCTTACCA	80.4
t-12s19h,C3,	CCTGACGAGAAACACCAGAACGAGTAGGCTGCTCATTGAGTGA	69.1
t-12s29h,D3,	ACGTGGACTCCAACGTCAAAGGGCGAATTTGGAACAAGAGTCC	79.1
t-12s9h,E3,	TGCTATTTTGCACCCAGCTACAATTTTGTGTTTGAAGCCTTAAA	71.7
t-1s10e,F3,	AGAGAATAACATAAAAAACAGGGAAGCGCATTAA	39.0
t-1s12i,G3,	AGGGATAGCTCAGAGCCACCACCCCATGTCAA	66.3
t-1s14e,H3,	ATTTTCTGTGTCAGCGGAGTGAGAATACCGATAT	68.8
t-1s14i,A4,	CAACAGTTTATGGGATTTTGCTAATCAAAGG	69.7
t-1s16e,B4,	ATTCGGTCTGCGGGATCGTCACCCGAAATCCG	77.1
t-1s16i,C4,	GCCGCTTTGCTGAGGCTTGACAGGGGAAAAGGT	67.6
t-1s18g,D4,	CGACCTGCGGTCAATCATAAGGGAACGGAACAACATTATT	72.3
t-1s18i,E4,	GCGCAGACTCCATGTTACTTAGCCCGTTTTAA	52.3
t-1s20e,F4,	ACAGGTAGAAAGATTCATCAGTTGAGATTTAG	62.1
t-1s22i,G4,	CGCGTCTGATAGGAACGCCATCAACTTTTACA	69.9
t-1s24e,H4,	CAGTTTGACGCACTCCAGCCAGCTAAACGACG	57.4
t-1s24i,A5,	AGGAAGATGGGGACGACGACAGTAATCATATT	58.0
t-1s26e,B5,	GCCAGTGCGATCCCCGGGTACCGAGTTTTTCT	82.4
t-1s26i,C5,	CTCTAGAGCAAGCTTGCATGCCTGGTCAGTTG	68.0
t-1s28g,D5,	TTTACCAGCCTGGCCCTGAGAGAAAGCCGGCGAACGTGG	69.8
t-1s28i,E5,	CCTTCACCGTGAGACGGGCAACAGCAGTCACA	76.3
t-1s2i,F5,	CCTTTTTTCATTTAACAATTTTCATAGGATTAG	56.2
t-1s30e,G5,	CGAGAAAGGAAGGGGAAGCGTACTATGGTTGCT	61.6
t-1s4e,H5,	TTATCAAACCGGCTTAGGTTGGGTAAGCCTGT	76.1
t-1s4i,A6,	TTTAACTATCATAGGTCTGAGAGTTCCAGTA	73.3
t-1s6e,B6,	TTAGTATCGCCAACGCTCAACAGTCGGCTGTC	71.2
t-1s6i,C6,	AGTATAAAATATGCGTTATACAAAGCCATCTT	64.7
t-1s8g,D6,	TTTCCTTAGCACTCATCGAGAACAATAGCAGCCTTTACAG	60.4

t-1s8i,E6,	CAAGTACCTCATTCCAAGAACGGGAAATTCAT	67.2
t-2s11g,F6,	CCTCAGAACC GCCACCCAAGCCCAATAGGAACGTAAATGA	61.3
t-2s13g,G6,	AGACGTTACCATGTACCGTAACACCCCTCAGAACCGCCAC	61.0
t-2s15f,H6,	CACGCATAAGAAAGGAACAATAAGTCTTTCC	62.0
t-2s17f,A7,	ATTGTGTCTCAGCAGCGAAAGACACCATCGCC	68.6
t-2s1g,B7,	AAAACAAAATTAATTAATGGAAACAGTACATTAGTGAAT	75.0
t-2s21g,C7,	GCTCATTTTTTAACCAGCCTTCTGTAGCCAGGCATCTGC	70.8
t-2s23g,D7,	GTAACCGTCTTTCATCAACATTAATAATTTTTGTTAAATCA	69.7
t-2s25f,E7,	ACGTTGTATTCCGGCACCGCTTCTGGCGCATC	73.2
t-2s27f,F7,	CCAGGGTGGCTCGAATTCGTAATCCAGTCACG	66.3
t-2s3g,G7,	AGAGTCAAAAATCAATATATGTGATGAAACAAACATCAAG	64.8
t-2s5f,H7,	ACTAGAAATATATAACTATATGTACGCTGAGA	59.2
t-2s7f,A8,	TCAATAATAGGGCTTAATTGAGAATCATAATT	65.0
t-3s10g,B8,	AACGTCAAAAATGAAAAGCAAGCCGTTTTTATGAAACCAA	70.2
t-3s14e,C8,	GTTTTGTCAGGAATTGCGAATAATCCGACAAT	62.8
t-3s16e,D8,	GACAACAAGCATCGGAACGAGGGTGAGATTTG	77.3
t-3s18g,E8,	TATCATCGTTGAAAGAGGACAGATGGAAGAAAAATCTACG	65.6
t-3s20g,F8,	TTAATAAAAACGAACTAACC GA ACTGACCAACTCCTGATAA	53.1
t-3s24e,G8,	TGTAGATGGGTGCCGAAACCAGGAACGCCAG	62.6
t-3s26e,H8,	GGTTTTCCATGGTCATAGCTGTTTGAGAGGCG	65.1
t-3s28g,A9,	GTTTGCCTCACGCTGGTTTGCCCAAGGGAGCCCCGATT	80.4
t-3s30g,B9,	TAGAGCTTGACGGGGAGTTGCAGCAAGCGGTCATTGGGCG	77.3
t-3s4e,C9,	GATTAAGAAATGCTGATGCAAAATCAGAATAAA	80.5
t-3s6e,D9,	CACCGGAATCGCCATATTTAACAAAATTTACG	63.0
t-3s8g,E9,	AGCATGTATTCATCGTAGGAATCAAACGATTTTTTGT	81.4
t-4s11g,F9,	AGGTTTAGTACCGCCATGAGTTTCGTACCAGGATCTAAA	67.3
t-4s13g,G9,	AGCGTAACTACAACTACAACGCCTATCACCGTACTCAGG	63.4
t-4s15f,H9,	TAGTTGCGAATTTTTTACGTTGATCATAGTT	61.1
t-4s17f,A10,	GTACAACGAGCAACGGCTACAGAGGATACCGA	68.4
t-4s1g,B10,	GAGCAAAAGAAGATGAGTGAATAACCTTGCTTATAGCTTA	66.5
t-4s21g,C10,	GTAAAATTCGCATTAATGTGAGCGAGTAACACACGTTGG	75.8
t-4s23g,D10,	GGATAGGTACCCGTCGGATTCTCCTAAACGTTAATATTTT	68.2
t-4s25f,E10,	AGTTGGGTCAAAGCGCCATTCGCCCGTAATG	71.2
t-4s27f,F10,	CGCGCGGGCCTGTGTGAAATTGTTGGCGATTA	70.1
t-4s3g,G10,	ACATAGCGCTGTAATCGTCGCTATTCATTTCAATTACCT	69.5
t-4s5f,H10,	GTAAATACAATCGCAAGACAAAGCCTTGAAA	68.1
t-4s7f,A11,	CCCATCCTCGCCAACATGTAATTTAATAAGGC	52.7
t-5s10g,B11,	TCCAATCAAATAAGATTACCGCGCCCAATAAATAATAT	58.0
t-5s16e,D11,	AACAGCTTGCTTTGAGGACTAAAGCGATTATA	74.6
t-5s18g,E11,	CCAAGCGCAGGCGCATAGGCTGGCAGAACTGGCTCATTAT	75.0
t-5s20g,F11,	ACCAGTCAGGACGTTGGAACGGTGTACAGACCGAAACAAA	75.4
t-5s26e,H11,	TGCTGCAAATCCGCTCACAATCCCAGCTGCA	59.4
t-5s28g,A12,	TTAATGAAGTTTGATGGTGGTCCGAGGTGCCGTAAGCA	70.8

t-5s30g,C12,	CTAAATCGGAACCCTAAGCAGGCGAAAATCCTTCGGCCAA	69.4
t-5s6e,D12,	GTGTGATAAGGCAGAGGCATTTTCAGTCCTGA	70.5
t-5s8g,E12,	ACAAGAAAGCAAATCAGATAACAGCCATATTATTTA	51.6
t-6s13f,F12,	ACAGACAGCCCAATCTCCAAAAAAAATTTCTTA	64.9
t-6s15c,G12,	CGAGGTGAGGCTCCAAAAGGAGCC	78.6
t-6s17f,H12,	ACCCCAGACTTTTTTCATGAGGAACCTTGCTTT	76.6
t-6s23f,A1,	CGGCGGATTGAATTCAGGCTGCGCAACGGGGGATG	67.1
t-6s25c,B1,	TGGCGAAATGTTGGGAAGGGCGAT	44.0
t-6s27f,C1,	TGTCGTGCACACAACATACGAGCCACGCCAGC	66.2
t-6s3f,D1,	TCCCTTAGAATAACGCGAGAAAACTTTTACCGACC	64.0
t-6s5c,E1,	GTTTGAAATCAAATATATTTTAG	66.3
t-6s7f,F1,	AATAGATAGAGCCAGTAATAAGAGATTTAATG	55.9
t-7s10g,G1,	GCCAGTTACAAAATAATAGAAGGCTTATCCGGTTATCAAC	63.7
t-7s18g,A2,	AAAACACTTAATCTTGACAAGAACTTAATCATTGTGAATT	73.3
t-7s20g,B2,	ACCTTATGCGATTTTATGACCTTCATCAAGAGCATCTTTG	77.8
t-7s28g,D2,	TTCCAGTCCTTATAAATCAAAAGAGAACCATCACCCAAAT	50.5
t-7s30g,E2,	CAAGTTTTTTGGGGTGCAAATCGGCAAAATCCGGGAAACC	77.8
t-7s8g,G2,	GCGCCTGTTATTCTAAGAACGCGATTCCAGAGCCTAATTT	65.6
t-8s15f,H2,	CGTTTTATCAGGTTTCCATTAACGGGAATACACT	63.1
t-8s17c,A3,	GGCAAAGTAAAATACGTAATGCC	52.9
t-8s25f,B3,	TCTTCGCTATTGGAAGCATAAAGTGTATGCCCGCT	69.1
t-8s27c,C3,	GCGCTCACAAGCCTGGGGTGCCTA	67.1
t-8s5f,D3,	TTCTGACCTAAAATATAAAGTACCGACTGCAGAAC	55.6
t-8s7c,E3,	TCAGCTAAAAAAGGTAAAGTAATT	53.3
t-9s10g,F3,	ACGCTAACGAGCGTCTGGCGTTTTAGCGAACCCAACATGT	81.7
t-9s20g,H3,	TGTTTTAATTTCAACTCGGATATTCATTACCCACGAAAGA	60.5
t-9s30g,B4,	CGATGGCCCACTACGTATAGCCCGAGATAGGGATTGCGTT	69.9
ts-rem1,D4,	GCGCTTAATGCGCCGCTACAGGGC	76.4

bridges between trapezoids (unpaired bases in red)

Rothemund's notation	sequence	T_m (°C)
t-5s2e-t6s23c-3T,A6,	TTAATTAATTTT TTT ACCATATCAAA	40.1
t-7s4e-t8s25c-2T,B6,	TTAATTT CATCTTAGACTTT ACAA	32.6
t-9s6e-t10s27c-1T,C6,	CTGTCCAGACG T ATACCGAACGA	57.2
t-11s8e-t12s29c-0T,D6,	TCAAGATTAGTGTAGCAATACT	59.9
t-5s12e-t6s3c-3T,E6,	TGTAGCATTCC TTT TATAAACAGTT	48.6
t-7s14e-t8s5c-2T,F6,	TTTAATTGTAT TTCCACC AGAGCC	39.2
t-9s16e-t10s7c-1T,G6,	ACTACGAAGG CTTAG CACCATTA	46.2
t-11s18e-t12s9c-0T,H6,	ATAAGGCTTGCAACAAAGTTAC	54.1
t-5s22e-t6s13c-3T,A7,	GTGGGAACAAA TTT CTATTTT GAG	69.0
t-7s24e-t8s15c-2T,B7,	CGGTGCGGGC TTCC AAAAACATT	52.5
t-9s26e-t10s17c-1T,C7,	ATGAGTGAG CTTT TAATATGCA	44.8
t-11s28e-t12s19c-0T,D7,	ACTATTAAGAGGATAGCGTCC	56.4