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Supporting Information

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A Two-State DNA Lattice Switched by DNA Nano-actuator[**]

Liping Feng, Sung Ha Park, John H. Reif, Hao Yan[*]

[*] Prof. Dr. H. Yan,

L. Feng, Prof. Dr. J. H. Reif,

Department of Computer Science

Duke University

Durham, NC 27708, USA

Fax: 1-919-660-6519

Email: hy1@cs.duke.edu

S. H. Park

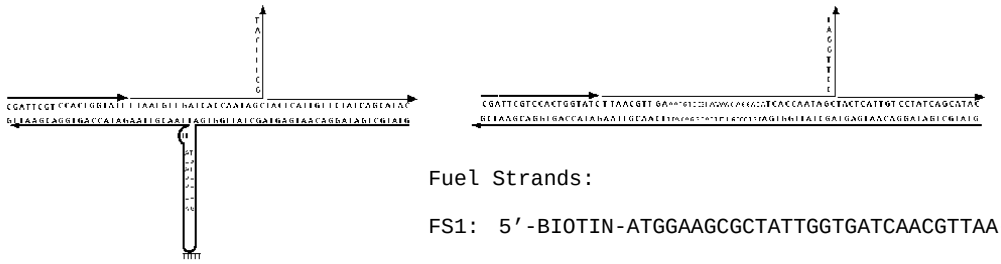
Department of Physics

Duke University

Durham, NC 27708, USA

Supplemental Information

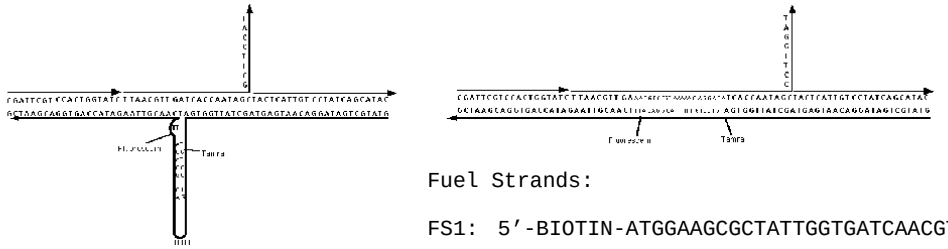
a) DNA sequences used in Fig. 1 & Fig. 2



Fuel Strands:

FS1: 5′-BIOTIN-ATGGAAGCGCTATTGGTGATCAACGTTAA-3′

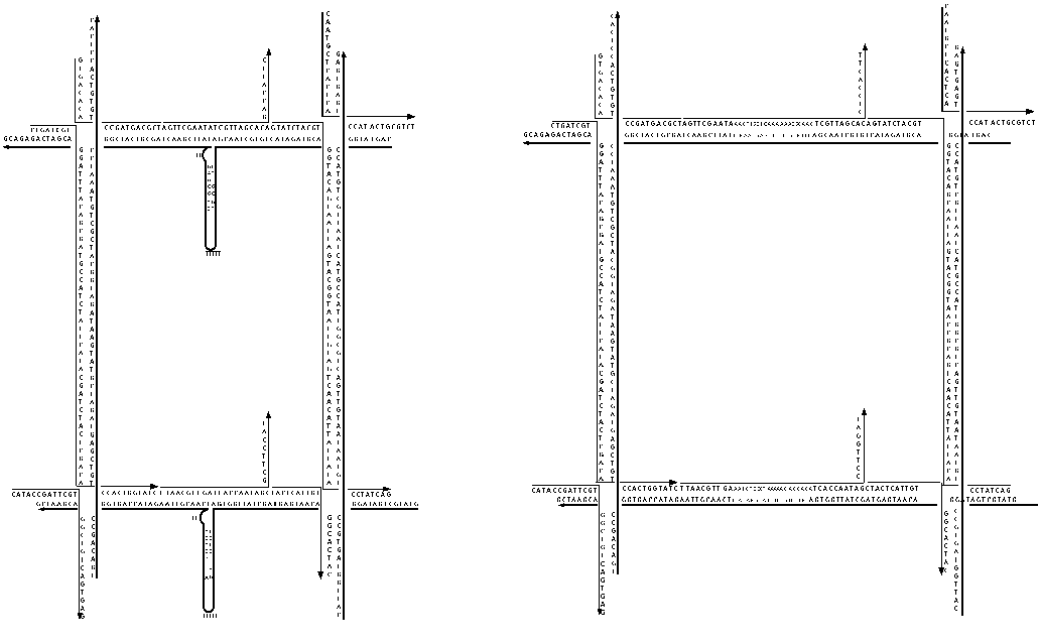
b) DNA sequences used in Fig. 3



Fuel Strands:

FS1: 5′-BIOTIN-ATGGAAGCGCTATTGGTGATCAACGTTAA-3′

c) DNA sequences used in Fig. 4 & Fig. 5



Fuel Strands:

1: 5′-BIOTIN-ATGGAAGCGCTATTGGTGATCAACGTTAA-3′

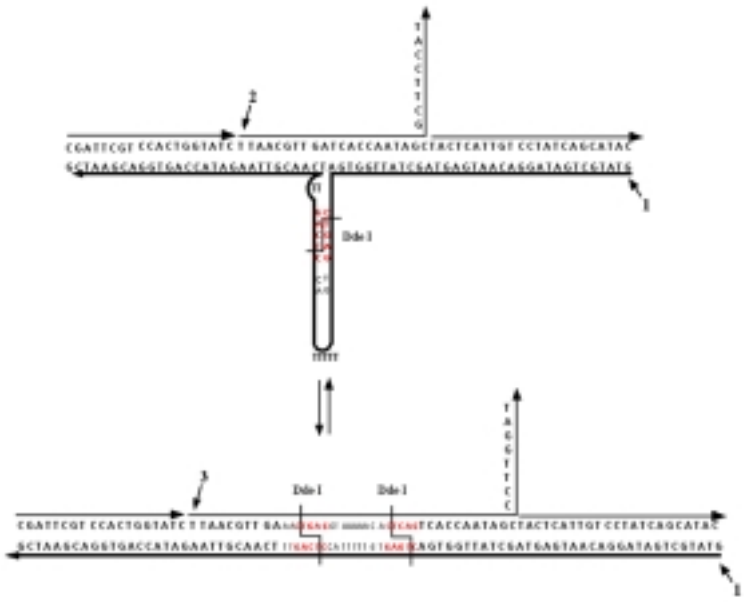
2: 5′-BIOTIN-ATCCAAGGGCTATTGGTGATGTCCTGTTTTTACGGACATTTCAACGTTAA-3′

d) **Further evidence of structural transformation of the DNA nano-actuator by restriction digestion experiments.**

1) **Design, material and methods:** A five base restriction site (Dde I) was engineered in the stem loop of the bulged 3-arm junction. In S1 state, there will be only one cleavage site while in S2 the opening of the stem loop will result in two restriction sites (labeled as red). By radioactively labeling of strands 1, 2, or 3 with P^{32} in S1 or S2. The restriction digestion pattern can provide evidence for the structural transformation of the device. S1 or S2 was formed by mixing their corresponding oligos in 1xNEB4 buffer (New England Biolab, USA) and annealed from 90 °C to room temperature. In each reaction, only one strand was radioactively labeled (the strand labeled is denoted in the column above the gel). 10 units Dde I was added to the mixture at 37 °C for 90 minutes. The samples with/without restriction digestions were loaded onto a 10% denaturing polyacrylamide gel (PAGE). Denaturing gel consists of 10% acrylamide (19:1acrylamide:bisacrylamide) and 50% urea. The running buffer consists of 89 mM Tris–HCl, 89 mM boric acid (pH 8.0), and 2 mM EDTA (TBE). The gels were run at 55 °C and 25 V/cm. Gels were dried on Whatman 3MM filter paper and exposed on Kodak X-OMAT AR film.

2) **Results:** The left-most lane contains 10 bp DNA linear marker. The first row of the table above the gel denotes the strand labeled in the two state of the device (their states are labeled as S1 or S2 over the bar above the table). The second row of the

table denotes the presence of absence of Dde I restriction enzyme. Lane A and lane B shows that Dde I digestion of S1 with strand 1 labled resulted in two cleavage. Lane C and lane D shows that Dde I digestion of S1 with strand 2 labled did not produce cleavage on strand 2. Lane E and Lane F shows that Dde I digestion of S2 with strand 1 labled still resulted in two cleavage. Lane G and lane H shows that Dde I digestion of S2 with strand 3 labled resulted in two cleavage. The results strongly indicate the formation of the duplex structure resulted from opening up of the stem loop in the bulged 3-arm junction.



S1

S2

			S1			S2		
LM	Stran	1	2	2	1	1	3	3
	Dde I	+	-	+	-	+	-	+