Supporting Information

Gating Electrical Transport Through DNA Molecules That Bridge Between Silicon Nanogap

Shogo Takagi,[a] Tadao Takada,[a,b] Naoto Matsuo,[a,b] Shin Yokoyama,[c] Mitsunobu Nakamura,[a,b] and Kazushige Yamana[a,b*]

[a] *Department of Materials Science and Chemistry,* [b] *Molecular Nanotechnology Research Center, University of Hyogo, 2167 Shosha, Himeji 671-2201, Japan. Tel: 81-79-267-4895; E-mail: yamana@eng.u-hyogo.ac.jp*
[c] *Research Institute of Nanodevice and Biosystems, Hiroshima University, 1-4-2 Kagamiyama, Higashi-hiroshima, Hiroshima 739-8527, Japan*

Preparation of 400-mer DNA with thiols (HS-dsDNA-SH) at both ends by using polymerase chain reaction (PCR). Preparation of 400-mer DNA by PCR technique was carried out by using λ-DNA (48502 bp) as a template and primers with disulfides (left primer: 5'-HO$(CH_2)_3SS(CH_2)_3$-TGC ACC GCC AGA TAT TCC, right primer: 5'-HO$(CH_2)_3SS(CH_2)_3$-ATC AAC ACG GTT CAG CAA CA). The 400-mer DNA fragments obtained by PCR was purified by 5% non-denaturing PAGE (polyacrylamide gel electrophoresis) according to general protocols and procedures. After running the gel, the fragments corresponding to the 400-mer DNA were recovered by adding an elution buffer (10 mM Tris·Cl, pH 7.5, 50 mM NaCl, 1 mM EDTA) to desired DNA bands cut out from the gel. The DNA product was precipitated by adding 100 % ethanol, and the solution was centrifuged. The DNA pellet was dissolved in 10 mM Tris·Cl buffer (pH 7.5) after removing the supernatant solution and rinsing the pellet with 70 % ethanol. To this solution, a reducing reagent (1 mM dithiothreitol, DTT) was added to convert the disulfides to thiols. Excess DTT in the solution was removed and the buffer was exchanged to Na phosphate buffer (20 mM, pH 7.0) by using a bio-spin column (Bio-Gel P-30 polyacrylamide gel) prior to use. HS-dsDNA was prepared by using disulfide modified left primer and unmodified right primer in a similar procedure above.

Sequence of DNA used in the present study.

5'-TGCACCGCCAGATATTCCGGCTGGCTTTGTGGCTGTTTTCAACAGTG
ATGAGGCATCGTGGCATCTCGTTGAAGACCATCGGGGTAAAACCGTCTA
TGACGTGGCTTCCGGCGACGCGTTATTTATTTCTGAACTCGGTCCGTTA

CCGGAAAATTTTACCTGGTTATCGCCGGGAGGGGAATATCAGAAGTGGA
ACGGCACAGCCTGGGTGAAGGATACGGAAGCAGAAAAACTGTTCCGGA
TCCGGGAGGCGGAAGAAACAAAAAAAAAGCCTGATGCAGGTAGCCAGTG
AGCATATTGCGCCGCTTCAGGATGCTGCAGATCTGGAAATTGCAACGAA
GGAAGAAACCTCGTTGCTGGAAGCCTGGAAGAAGTATCGGGTGTTGCT
GAACCGTGTTGAT-3’

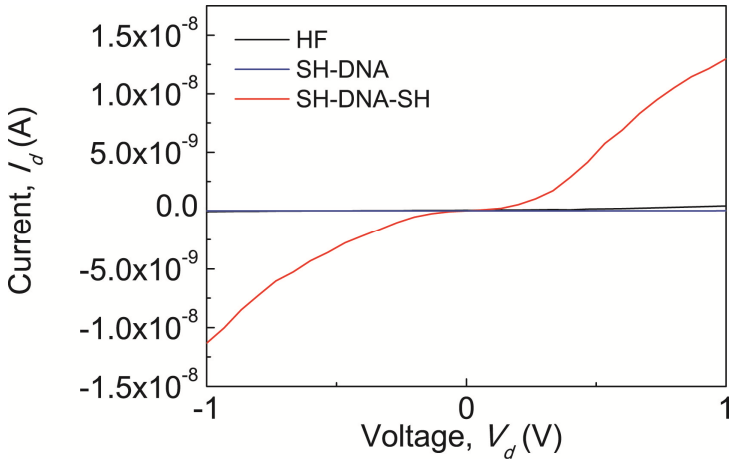

Figure S1. *I-V* curves for DNA devices derived from 400-mer dsDNA (HS-dsDNA-SH and HS-dsDNA) on 120 nm gap. Line HF shows *I-V* response for bare electrode without bridge of DNA.