Self-Assembly of DNA Nanoprism with Only Two Component Strands

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Supplementary Information

Materials and Methods

Oligonucleotides. DNA oligonucleotides were designed by a computer program “SEQUIN” (N. C. Seeman, J. Biomol. Struct. Dyn. 1990, 8, 573-581.), purchased from Integrated DNA Technologies, Inc., and purified by denaturing polyacrylamide gel electrophoresis (PAGE). DNA sequence (underlined bases are the hinges):

- L3-nT: 5’-[AGGCACCATCG(T)nAGGTCTTGCC]-3’ (n = 0-1);
- Lk: 5’-(AGGCACCATCG(T)AGGTCTTGCC)-3’ (k = 3-6);
- Sc-nT: 5’-CGATGGTGCCTGGCAAGACCT(T)nTGACGCCGCA-3’ (n = 0-3);
- Sa: 5’-CGATGGTGCCTGGCCAAGACCT-3’;
- Sb: 5’-CGATGGTGCCTGGCAAGACCT-3’;

Formation of DNA complexes. DNA strands were combined according to the correct molecular ratios in a tris-acetic-EDTA-Mg2+ (TAE/Mg2+) buffer, which consisted of Tris (40 mM, pH 8.0), acetic acid (20 mM), EDTA (2 mM), and Mg(CH3COO)2 (12.5 mM). All hetero-prisms used the corresponding central strands Lk, and short strands Sa and Sb. The prism construction followed two-step self-assembly: (1) polygonal face motif formation: the mixture of Lk strand and Sa (or Sb) was annealed: 95 °C / 5 min, 65 °C / 30 min, 50 °C / 30 min, 37 °C / 30 min, 22 °C / 30 min, and 4 °C / 30 min; (2) prism formation: motif Lk / Sa and motif Lk / Sb were mixed together at 1:1 ratio and then re-annealed: 50 °C / 30 min, 37 °C / 30 min, 22 °C / 30 min, and 4 °C / 30 min. Homo-prisms were assembled a one-pot process: cooling solution of the Lk / Sc-nT (m = 0-3) at ratio 1:1 at 95 °C / 5 min, 65 °C / 45 min, 50 °C / 45 min; 37 °C / 45 min, 22 °C / 45 min; and 4 °C / 45 min. DNA concentrations were used as indicated in Figs. 2-4 unless specifically stated otherwise. DNA samples were then directly used for characterization, without further fractionation or purification.

Native PAGE. Gels contained 6% polyacrylamide (19:1 acrylamide/bisacrylamide) and were run on a SE-600 electrophoresis unit (18 cm x 16 cm, Hoefer) at 4°C (250 V, constant voltage). The running buffer of the electrophoresis was TAE/Mg2+ buffer. After electrophoresis, the gels were stained with Stains-all dye (Sigma) and scanned by a HP office scanner. The band intensity was estimated by Image J, an NIH-developed image-processing computer software.