

## Supporting Information for

# Strand Exchange Reaction Modulated Fluorescence “off-on” Switching of Hybridized DNA Duplex Stabilized Silver Nanocluster

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*Materials:* All DNA strands (S-1: 5' CTTCTCCACCCCCCAGGAGTCAGGTGCAC 3', S-2: 5' TGTTAGTTCAGTGCACCTGACTCCTGAGGAGAAG 3', S-3: 5' CTTCTCCTCAGGAGTCAGGTG CACTGAACTAACA 3') were synthesized by Shanghai Sangon Biotechnology Co. Ltd. (Shanghai, China). Other chemicals were commercially available and at least analytical grade. All DNA samples were prepared with phosphate buffer (20 mM phosphate, 1 mM magnesium acetate, pH 7.0). All the solutions were prepared with water purified by a Milli-Q system (Millipore, Bedford, MA, USA) and stored at 4 °C.

*Experimental details:* In a typical hybridization experiment, S-1 (2 μM) was first mixed with S-2 at the same concentration. Then DNA mixture solution was denatured at 95 °C for 15 minutes, followed with a slow annealing treatment for 3 hours to form DNA duplex, respectively. For the synthesis of fluorescent silver nanocluster, AgNO<sub>3</sub> (6:1 Ag/DNA molar ratio) was added into the S-1/S-2 duplex solution. After stirring for 15 minutes, the mixture solution was reduced with NaBH<sub>4</sub> (1:1 Ag/NaBH<sub>4</sub> molar ratio) for another 4 hours. In the strand exchange reaction, stoichiometric quantity of S-3 or S-2 (the concentrations of S-2 and S-3 stock solutions were both 100 μM) was added to the silver nanocluster solution.

*Instruments:* The fluorescence spectra were recorded by a Perkin-Elmer LS55 Luminescence Spectrometer (Perkin-Elmer Instruments U.K.) using a 1-cm path length quartz cell at room temperature. The slot widths of the excitation and emission were set at 10.0 and 15.0 nm, respectively. UV/vis absorption spectra were recorded by a CARY 500 UV/vis-near-IR Varian spectrophotometer. Native polyacrylamide gel electrophoresis (PAGE): ten microliters of the DNA strand or DNA stabilized silver nanocluster samples (in 20 mM phosphate buffer, 1 mM magnesium acetate, pH 7.0) were mixed with 2  $\mu$ L of loading buffer (20 mM phosphate buffer, pH 7.0, 1 mM magnesium acetate, 50% glycerol, 0.025% Bromphenol blue) and analyzed in 20% native polyacrylamide gel containing TBE buffer (89 mM Tris, 89 mM boric acid, 2 mM EDTA). The electrophoresis was carried out at room temperature for 3-4 hours at the constant voltage of 110 V. The resulting gel after staining with 0.5  $\mu$ g/ml ethidium bromide (dissolved in TBE buffer) for 30 min was photographed under the excitation of 365 nm UV light.