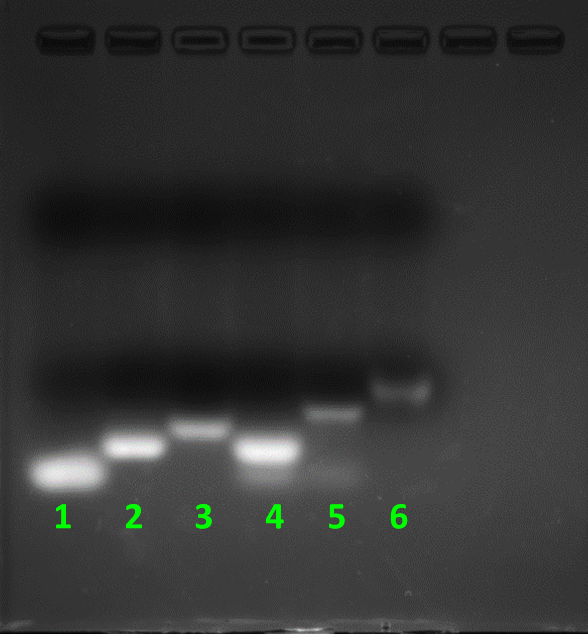
**Supporting information**

**ctDNA Detection** **Based on DNA Clutch Probes and Strand Exchange Mechanism**

**Huan Chang1,2, Yiyi Zhang2, Fan Yang2, Changtao Wang1\*, Haifeng Dong1,2\***

*1Beijing Advanced Innovation Center for Food Nutrition and Human Health, Beijing Technology and Business University (BTBU), Beijing, China, 2Beijing Key Laboratory for Bioengineering and Sensing Technology, Research Center for Bioengineering and Sensing Technology, School of Chemistry and Bioengineering, University of Science & Technology Beijing, Beijing, China*



**FIGURE S1.** Electrophoretic analysis of 1) complementary sequences (16 bp), 2) clutch probe 3 (35 bp), 3) clutch probe 5 (44 bp), 4) clutch probe 3 and clutch probe 5, 5) complementary sequence hybridize with clutch probe 3 and 6) complementary sequence hybridize with clutch probe 3 and clutch probe 5.

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**FIGURE S2.** PL spectra of the solution to verify the selectivity of the assay over several DNA strands.

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**FIGURE S3.** PL intensity of the solution without or with target DNA strands.