The profiles of pair interaction energy between ssDNA and Abs were shown in Fig. S1. The pair interaction energies (E + VWD) were equal to zero after \( r \) of 5.6 nm. Therefore, the \( r \) value was varied from 3.6 to 5.6 nm in 0.05 nm increments for our PMF calculations.

**Fig. S1.** (A) Pair interaction energies profile of PMF calculations at \( r \) of 3.6-5.6 nm.. (B) Pair interaction energies profile of PMF calculations at \( r \) of 5.0-5.6 nm.