Electronic Supplementary Information

Base Excision Repair Inspired DNA Motor Powered by Intracellular Apurinic/Apyrimidinic Endonuclease

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Supporting Figures

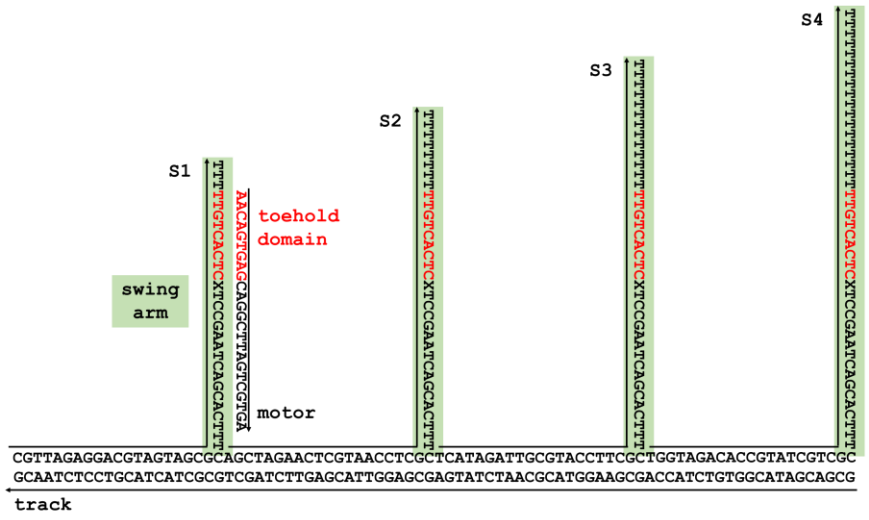

Fig. S1 DNA sequences of the nanostructure in **Fig. 1A-C**. X represents the AP site. The arrow is the 5’ end. s1-s4 represent the four stators, the toehold domains are marked in red and the swing arms of stators are highlighted in green.

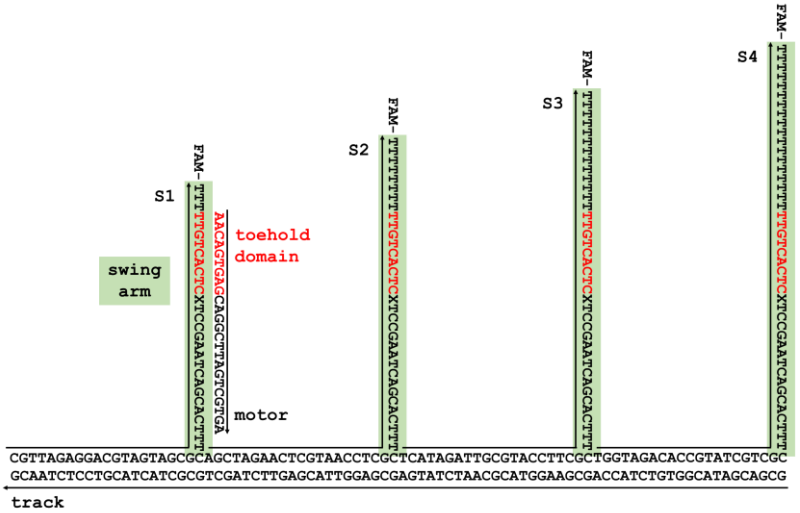

Fig. S2 DNA sequences of the nanostructure used in Fig. 1D. X represents the AP site. The arrow is the 5’ end. s1-s4 represent the four stators, the toehold domains are marked in red and the swing arms of stators are highlighted in green. For characterizing the products of the DNA motors with different movement pattern, FAM-labeled stators without AP site were used.

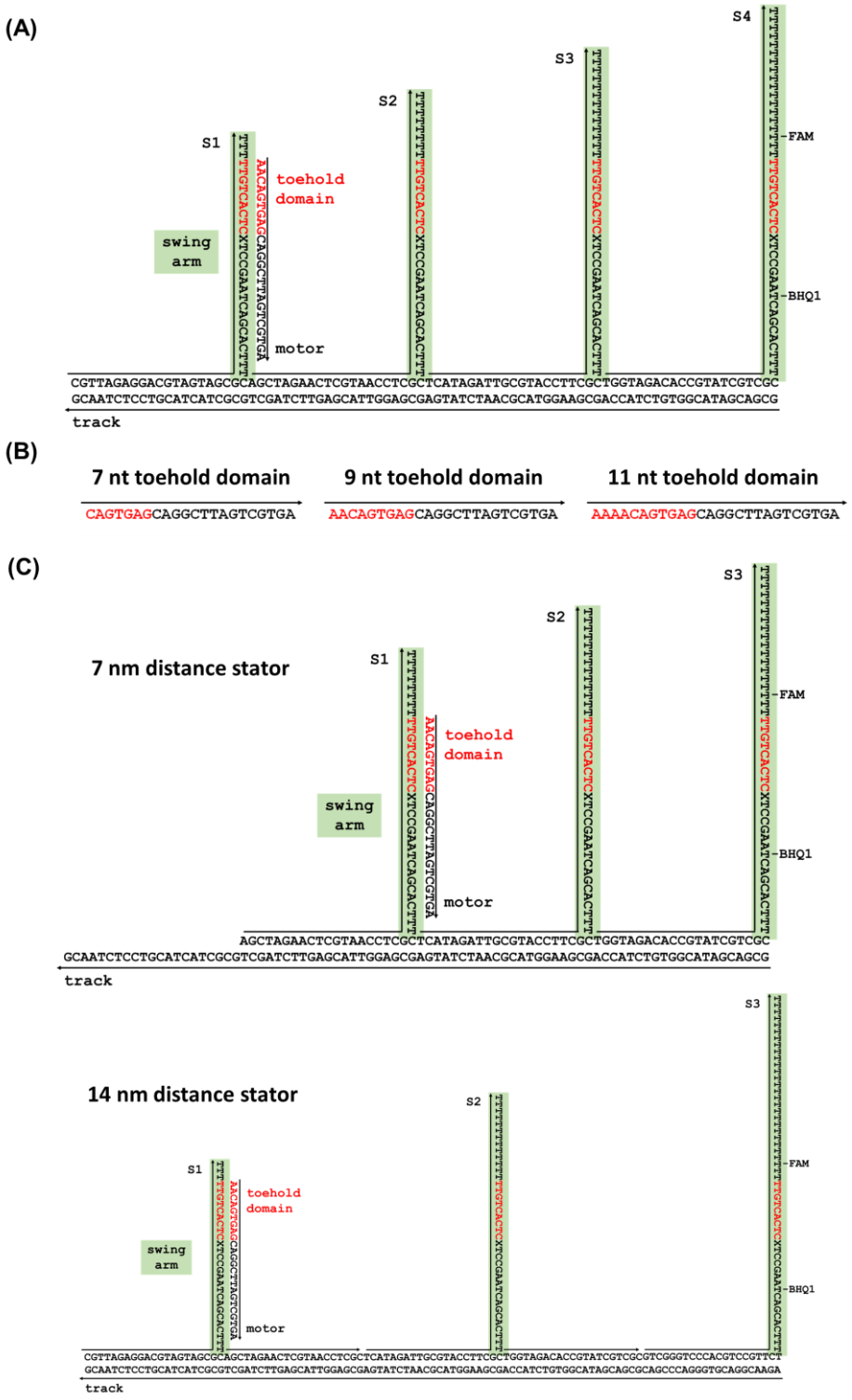

Fig. S3 DNA sequences used in Fig. 2. (A) Strands of the fluorogenic DNA motor, (B) The motor strands for the design of different toehold domain, (C) Strands of DNA motor systems with different distance stators. X represents the AP site. The arrow is the 5' end. The toehold

domains involved in the strand displacement are marked in red and the swing arms of stators are highlighted in green.

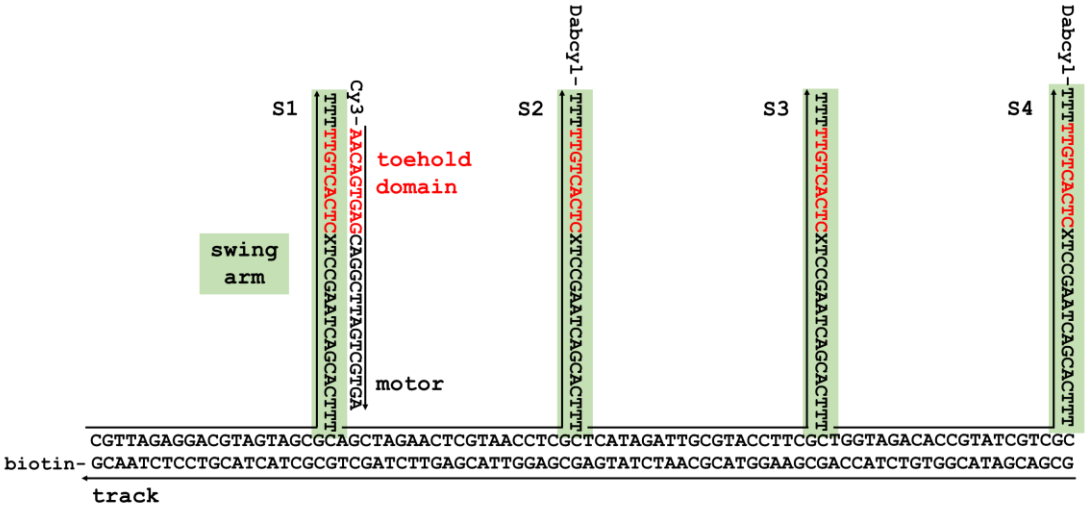

Fig. S4 DNA sequences for single-molecule analysis (Fig. 3). X represents the AP site. The arrow is the 5’ end. The toehold domain is marked in red. s1-s4 represent the four stators, the toehold domains are marked in red and the swing arms of stators are highlighted in green.

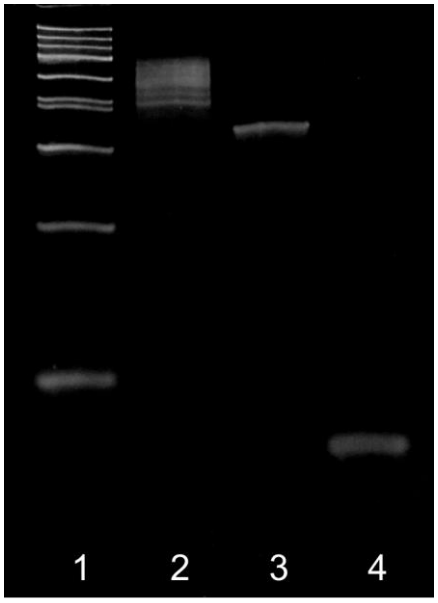

Fig. S5 Native PAGE analysis of the DNA nanostructures. Lane 1: 50-bp marker. Lane 2: the entire DNA motor system (s1, s2, s3, s4, the track strand, and the motor strand in Fig. S1). Lane

3: the complex of s2, s3, s4, and the track strand in Fig. S1. Lane 4: the duplex of the motor strand and s1 in Fig. S1.

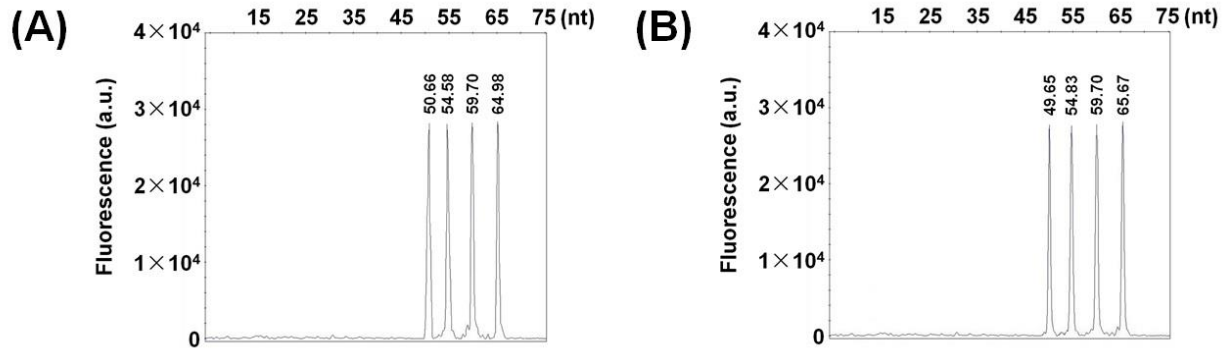

Fig. S6 CE analysis of the non-activated DNA motors. (A) without APE1, (B) without the motor strand.

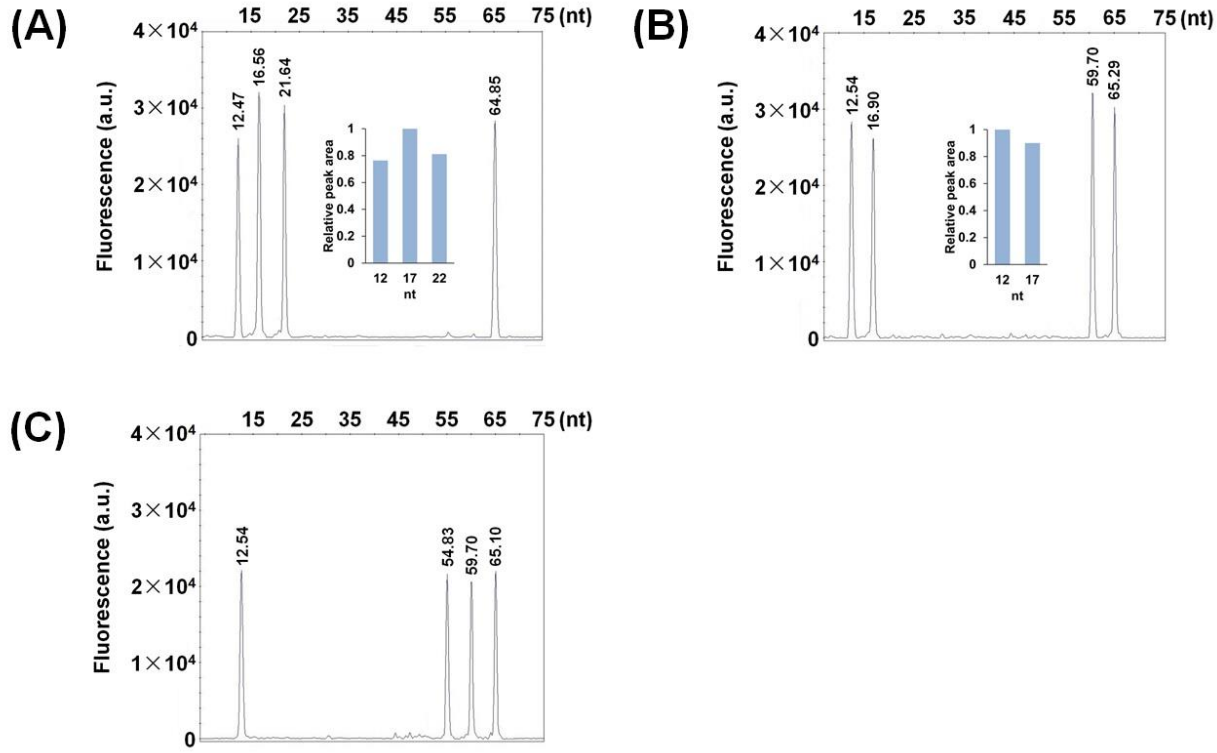

Fig. S7 CE analysis of the operational products of the DNA motors with different movement pattern. (A) s1 to s4, s4 is a non-AP site stator. (B) s1 to s3, s3 and s4 are non-AP site stators. (C)

s1 to s2, s2, s3 and s4 are non-AP site stators. Inset: the peak area of the released fragments from the intact stators.

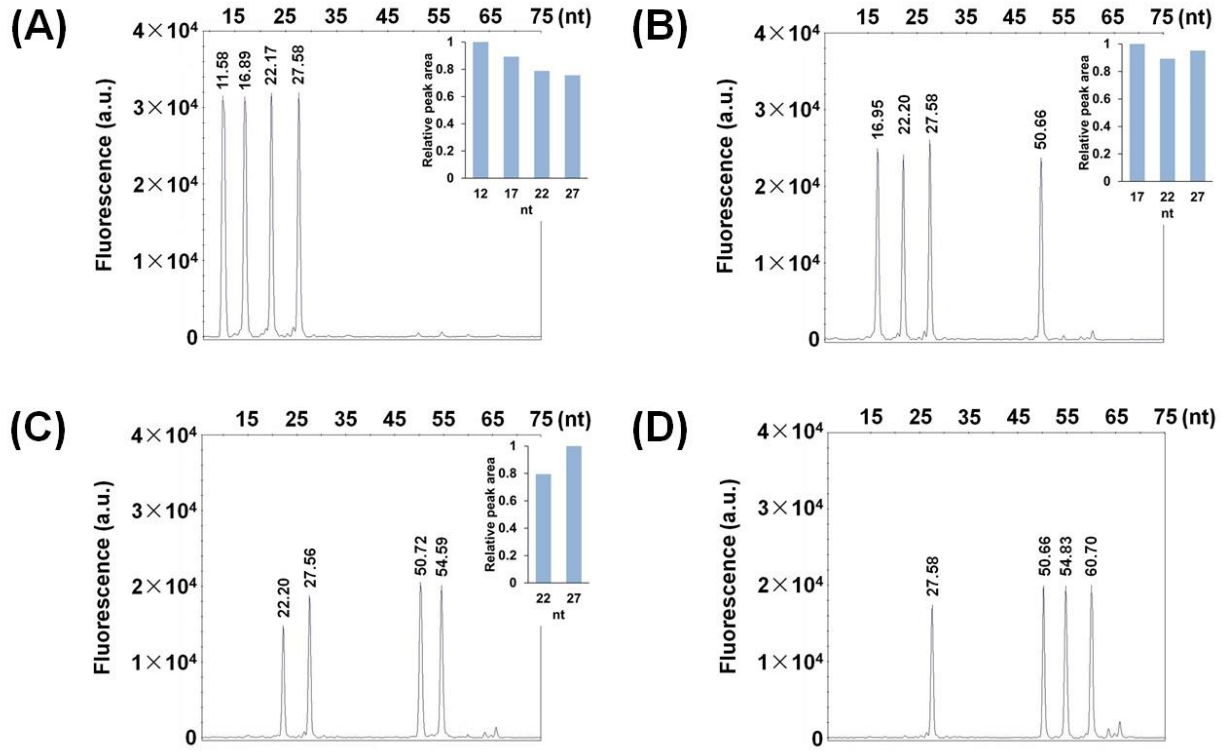

Fig. S8 CE analysis of the operational products with the opposite direction of **Fig. S7** of the DNA motors with different movement pattern. (A) s4 to s1, all stators contain AP site. (B) s4 to s1, s1 is a non-AP site stator. (C) s4 to s2, s1 and s2 are non-AP site stators. (D) s4 to s3, s1, s2 and s3 are non-AP site stators. Inset: the peak area of the released fragments from the intact stators.

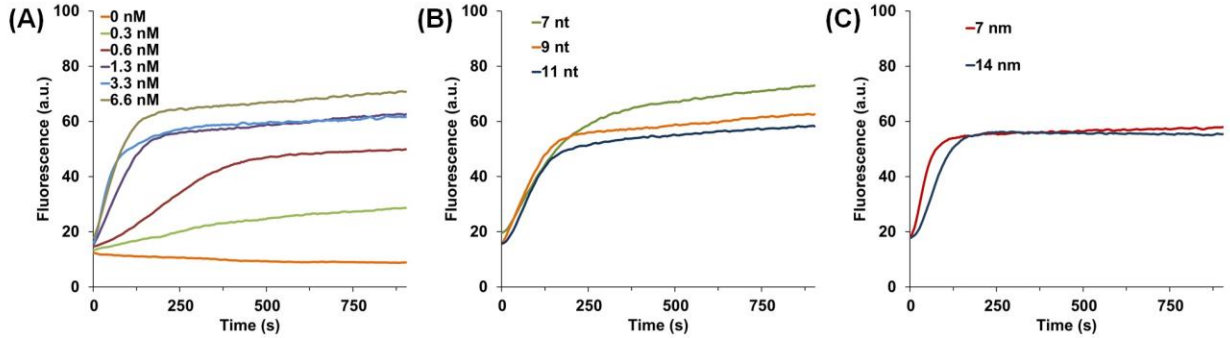

Fig. S9 Exploring the speed when operating the DNA motor from s4 to s1. (A) The effect of APE1 concentration. (B) The effect of toehold length. (C) The influence of stator distance. The DNA constructs were used as those in **Fig. S3**. When operating the DNA motor from s4 to s1, the motor stand was located in s4 initially and s1 was labeled with FAM and BHQ1 at the same position.

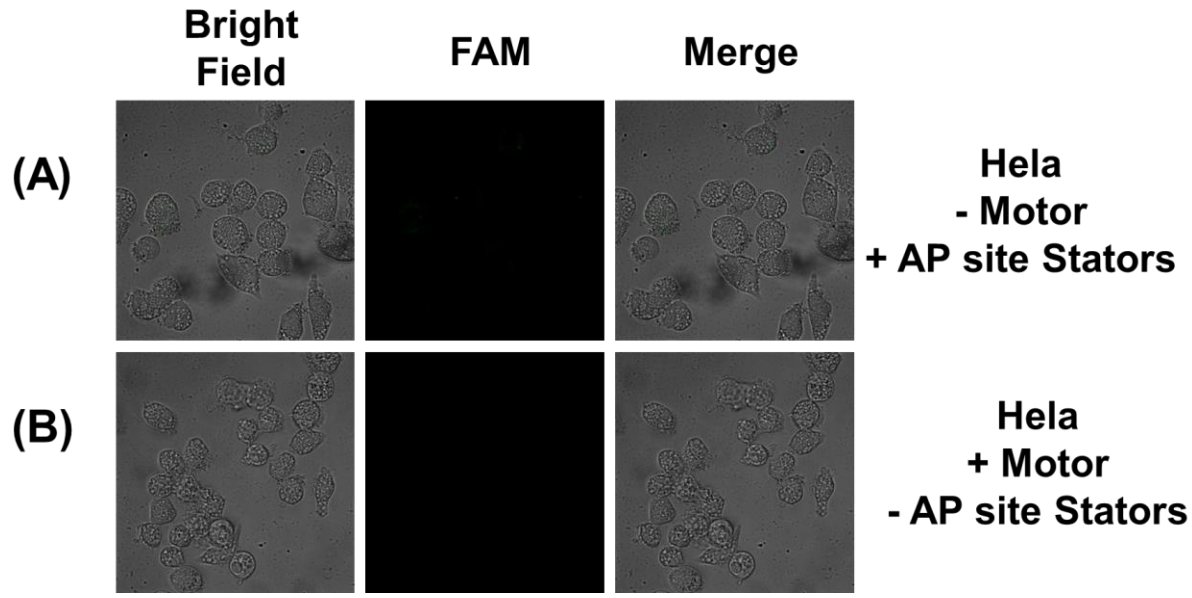

Fig. S10 Fluorescence imaging of the DNA Motor without the motor strand (A) or the AP site stators (B) in Hela cell.

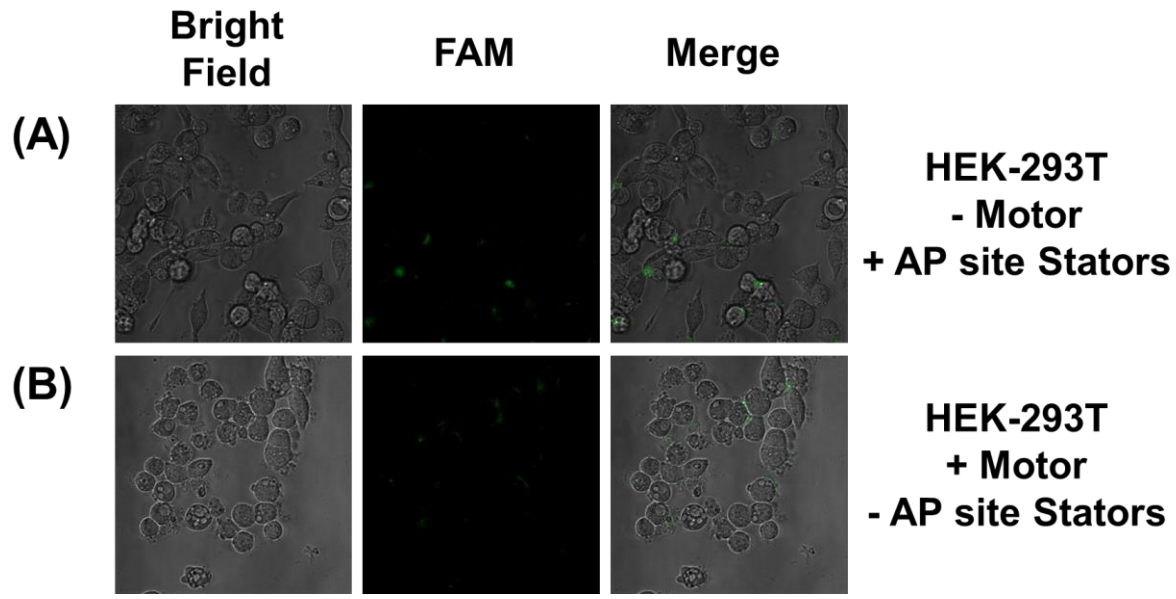

Fig. S11 Fluorescence imaging of the DNA Motor without the motor strand (A) or the AP site stators (B) in HEK-293 cell.

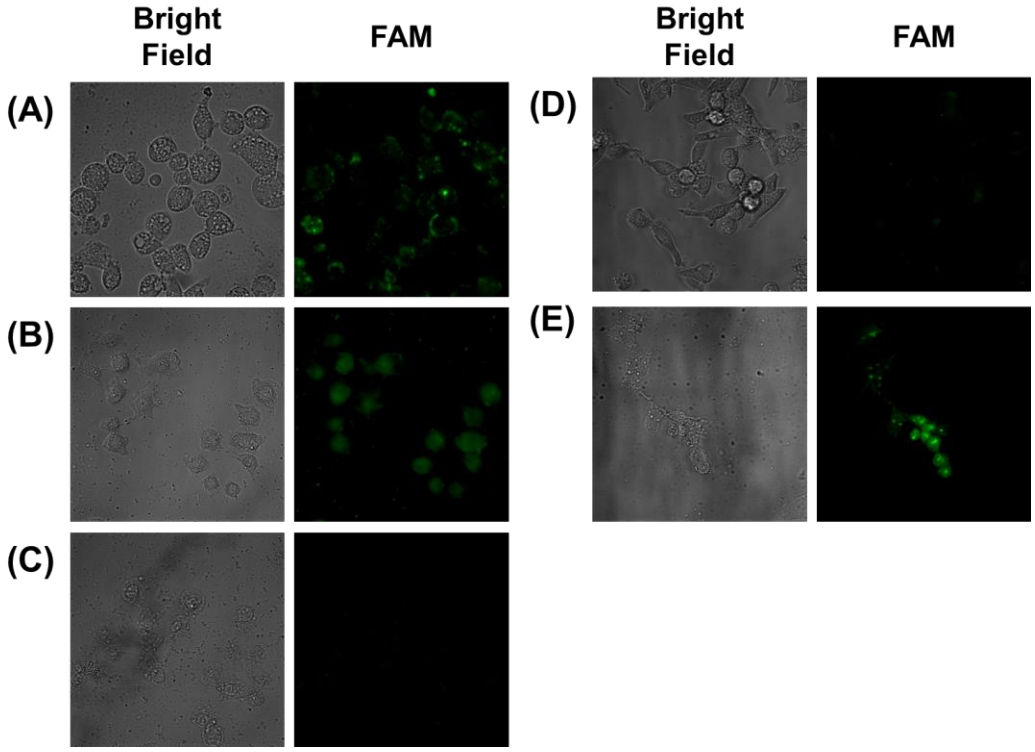

Fig. S12 The original images (bright field and fluorescence) in **Fig. 4**. (A) Hela cell, (B) AP endonuclease enhancer TBHP treated Hela cell, (C) AP endonuclease inhibitor NCA treated Hela cell, (D) HEK-293T cell, (E) AP endonuclease enhancer TBHP treated HEK-293T cell.