

An artificial motor protein that walks along a DNA track

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We demonstrate the realization of an artificial protein motor called Tumbleweed (TW) that walks directionally along a DNA track under external control. TW consists of three legs, each with a ligand-gated DNA-binding domain that enables selective interaction with specific sites along a DNA track. Using single-molecule fluorescence assays and a programmable microfluidic device, we show that TW steps directionally along a designed DNA track in response to a defined sequence of ligand inputs. We discuss the motor performance from the viewpoint of stochastic thermodynamics.

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