

Nanofluidic devices for single-molecule analysis of protein-DNA complex

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Abstract

A nanofluidic platform to identify specific binding locations of proteins along genomic DNA molecules. This device has the ability to distinguish a real protein-DNA complex from a non-specific one, thereby providing more reliable and accurate information. We have also demonstrated that the protein binding sites can be measured with sub-100nm resolution. This technique can also be used for other relevant studies like epigenetic analysis on genomic DNA molecules. Our method also opens the possibility for a lab-on-chip device in which in-vivo complexed DNA-protein samples can be extracted and protein-binding sites mapped.

Technological Advantages

Simple, robust and comparatively inexpensive device fabrication. Has multiplexing ability, easier to attain statistical data. Can distinguish real events from false positive results, providing more accurate information. Mapping protein binding sites with sub-100nm resolution. Possibility for a lab-on-chip device in which in-vivo complexed DNA-protein samples can be extracted and protein-binding sites mapped.

Applications of Technology

Single-cell and single-molecule analysis of biopolymers (DNA or DNA-protein complex) for general assays of DNA DNA-protein interactions, drug-DNA interactions (e.g. cancer drug cisplatin-DNA interactions) Drug-protein-DNA interactions Epigenetic analysis and disease diagnostics.

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