

Towards single-molecule printing with nanopipettes

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Manipulation and investigation of single molecules at the nano-scale is a powerful approach that has the potential to reveal a range of characteristic properties of the molecules which are often obscured when studied using traditional ensemble-averaging techniques. The potential for controlled delivery and the precise manipulation of biomolecular components directly onto or into a target platform makes nanopipettes an attractive tool for single molecule delivery. We will present nanopipettes with 20-100nm sized pores as a tool to detect, deliver, and analyze single entities including linear DNA, plasmid DNA, and DNA origami. The characteristic peak structure of the ionic current, peak blockage current and peak dwell time under an applied potential allows us to distinguish different types of biological molecules. Preliminary analysis has demonstrated that voltage controlled delivery via nanopipettes is sensitive enough to deduce structural variations between different DNA origami. In future work this technique will be coupled with scanning ion conductance microscopy to enable controlled delivery of single molecule on solid substrates for molecular interaction studies.

References:

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