



JOSEPH LARKIN 'Toward Efficient Single-Molecule DNA Sequencing with Nanopore-Zero-Mode Waveguides'

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Seminar, October 27, 2015, 10:30. Seminar Room

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Single-molecule DNA sequencing has the potential to read previously unsequenced genomic regions. It beats bulk techniques by extending molecular read lengths by two or more orders of magnitude and potentially lowering necessary quantities of input DNA. However,

inefficiency in DNA delivery to sequencing devices limits the applicability of current single-molecule technologies. This challenge is critical for samples that must not be enzymatically amplified like cancer genomes or single cells. We enhance the loading efficiency for Single Molecule, Real-Time (SMRT) sequencing technology, in which single DNA polymerases are imaged in nanoscale zero-mode waveguides (ZMWs) as they synthesize DNA strands. By fabricating nanopores at the bases of the ZMWs, we electrophoretically capture sample DNA into the sequencing volume, enhancing loading efficiency by two orders of magnitude. We demonstrate the principle of sequencing with these devices by capturing DNA-DNA polymerase complexes in ZMWs and activating the enzymes. This paves the way for sequencing unamplified genomes from single cells, needle biopsies, and other samples of medical or scientific interest.

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Hosted by Prof. Maria Garcia-Parajo