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Single Molecule Enzymology via Nanoelectronic Circuits[1]

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Traditional single-molecule techniques rely on fluorescence or force transduction to monitor conformational changes and biochemical activity. Recent demonstrations of single-molecule monitoring with electronic transistors are poised to add to the single-molecule research toolkit. The transistor-based technique is sensitive to the motion of single charged side chain residues and can transduce those motions with microsecond resolution, opening the doors to single-molecule enzymology with unprecedented resolution. Furthermore, the solid-state platform provides opportunities for parallelization in arrays and long-duration monitoring of one molecule's activity or processivity, all without the limitations caused by photo-oxidation or mutagenic fluorophore incorporation. This presentation will review some of these advantages and their particular application to DNA polymerase I processing single-stranded DNA templates.

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