Abstract Submitted
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Nanopore Mass Spectrometry[1] DEREK STEIN, JOSEPH BUSH, MIRNA MIHOVILOVIC, WILLIAM MAULBETSCH, WOOYOUNG MOON, CARTHENE BAZEMORE-WALKER, PETER WEBER, Brown University — We describe a concept for single-DNA analysis called nanopore mass spectrometry, which seeks to combine the benefits of nanopores with the speed, sensitivity, and robustness of single base detection by mass spectrometry. The basic idea is to cleave the individual nucleotides from a DNA polymer as they transit a nanopore in sequence, and to identify each one by determining its charge-to-mass ratio in a mass spectrometer. We describe how nanopore mass spectrometry can addresse the challenges faced by other nanopore-based DNA analysis approaches. We also describe the design, construction, and testing of a prototype instrument that interfaces a nanopore ion source with a quadrupole mass filter and a single ion detector. We are using this new instrument to test the key scientific questions bearing on our analysis strategy: 1) Can DNA nucleotides be reliably transferred from their native liquid phase into the vacuum environment of a mass spectrometer? 2) Can nucleotides be detected with near 100% efficiency? 3) Can DNA polymers be controllably cleaved to isolate ionized bases or nucleotides in the mass spectrometer?

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