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Single carbon nanotube based nanofluidic devices for single-stranded DNA translocation JIN HE, DI CAO, PEI PANG, HAO LIU, Biodesign Institute, Arizona State University, STUART LINDSAY, Biodesign Institute, Department of Chemistry and Biochemistry, Department of Physics, Arizona State University, HAITAO LIU, JINYAO TANG, COLIN NUCKOLLS, Department of Chemistry, Columbia University, PREDRAG KRISTIC, SONY JOSEPH, Physics Division, Oak Ridge National Laboratory — We have recently succeeded in fabricating a single carbon nanotube (CNT) based nanofluidic devices in which just one single-walled carbon nanotube (SWCNT) bridges two fluid reservoirs, using careful control experiments to show that fluid flow is through the SWCNT and not via a leakage path. Our device worked as a nanopore device and also contained a field effect transistor (FET) component. We investigated the filling effect of pure water and different salt solutions to individual SWCNT by measuring the electrical transport characteristics. Obvious change in the electrical properties of semiconducting SWCNTs during filling process was observed. We also measured the ionic current of these devices. Electrophoretic transport of short single stranded DNA oligomers through CNT was marked by a large transient increases in ion current and was confirmed by polymerase chain reaction (PCR) analysis. The CNT based nanofluidic device has the potential to act as a single-molecule sensor and new type of nanopore for controlling of DNA translocation.

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