Abstract Submitted
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A novel fabrication process of hundreds of field effect transistors around one single carbon nanotube for molecular assembly[1] XIAN ZHANG, DANIEL CHENET, BUMJUNG KIM, JAEEUN YU, COLIN NUCKOLLS, JAMES HONE, Columbia University — Carbon nanotube field effect transistors (CNTFETs) can be used both as stand-alone electronic devices and as basis for other devices, but high-throughput fabrication remains an important challenge. In one specifically demanding application, CNTFETs are lithographically 'cut' and rejoined with single molecules in the gap, to yield circuits for studying transport properties of single molecules. Because of the extreme precision required, such devices have a fabrication yield of only a few percent, which severely limits the speed of implementing CNT-molecule devices. In addition, the diversity of CNT structures provides an additional source of heterogeneity that makes collection of meaningful statistics difficult. Here we report a novel fabrication method to produce a chip with over 600 CNTFETs fabricated on one CNT. We use long (1cm) flow-aligned CNTs grown by chemical vapor deposition. Two photolithography steps are then used to pattern contacts and define a mask to burn away extra CNTs by oxygen plasma. We present the statistics of the transport properties of these devices including threshold voltage and on-state resistance. The devices are then lithographically cut and reconnected with DNA to provide consistent measurements of DNA conductance.

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