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Fabrication and transport properties of size tunable single-walled carbon nanotube quantum dots[1] PAUL STOKES, YODCHAY JOMPOL, SAIFUL I. KHONDAKER, University of Central Florida, Nanoscience Technology Center and Dept of Physics — Single electron transistors (SETs) have attracted considerable attention because of their potential as a building block for quantum based nanoelectronic devices. However fabrication of reproducible and controllable quantum dot sizes that can operate at high temperature is challenging. We developed a novel technique for the fabrication of size tunable and controllable quantum dot using single-walled carbon nanotube (SWNT) [1]. Our technique is based on the formation of two tunnel barriers of controllable separation by naturally bending SWNT at the edges of a raised local gate. A SWNT is placed on a local Al/Al_2O_3 bottom gate of width L, and then contacted with Pd source and drain electrodes of 1 μm separation on Si/SiO_2 substrates. The Al gate serves three purposes: (i) it acts as a "mechanical template" to define two tunnel barriers at the edges by naturally bending the nanotube due to van der Walls interactions with the substrate, (ii) the width of the gate defines the size (L) of the quantum dot, and (iii) it acts as a local bottom gate to control the operation of the SET device. Using this approach we fabricated SETs of different sizes down to 50 nm. We present detailed fabrication procedures and low temperature transport studies of these SET devices. [1] P. Stokes and S. I. Khondaker, APL **92**, 262107 (2008).

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