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Carbon Nanotube Gated Lateral Resonant Tunneling Field-Effect Transistor D. P. WANG, B. R. PERKINS, A. ZASLAVSKY, A. J. YIN, J. M. XU, Department of Physics and Division of Engineering, Brown University — Carbon nanotubes have generated a great deal of interest for use in novel devices due to their small size and high current densities. We have produced a new type of lateral resonant tunneling field-effect transistor using a Y-junction multiwalled carbon nanotube as the dual gate on a narrow wire etched from a modulation-doped GaAs/AlGaAs heterostructure. The two branches of the Y-junction nanotube produced in an alumina nanotemplate array [1] are used as gates to produce a voltage-tunable double-barrier potential for the carriers traveling from source to drain along the wire. The three terminal I-V characteristics of the device have been measured at 4.2K. Conductance oscillation is observed as a function of dual gate potential, indicating electron resonant tunneling through the energy states between the barriers. Detailed measurement and comparison with self-consistent potential simulations will be presented.

[1]Li, J., Papadopoulos, C. and Xu, J. M., "Growing Y- Junction Carbon Nanotubes" Nature 402, 253-254, 2000.

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