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Controlled Dielectrophoretic Positioning of Carbon Nanotubes SARBAJIT BANERJEE, BRIAN WHITE, LIMIN HUANG, STEPHEN O'BRIEN, IRVING HERMAN, Nanoscale Science and Engineering Center, Columbia University, New York, NY — Single-walled carbon nanotubes have been dielectrophoretically aligned between micropatterned electrodes. Use of a limiting resistor enables control over the number of carbon nanotubes deposited in the electrode gap. Further, the electric field between micropatterned electrodes can be perturbed by arrays of metal nanostructures. Simulating electric fields in the presence of metal objects allows us to design electrodes with arrays of metal dots for the precise positioning of nanotubes. Complex network structures can be fabricated using carefully placed metal nanostructures and also by varying the electrode geometry. Crossed-junction nanotube structures have been controllably fabricated by optimization of the electrode geometry, applied electric field, and load resistor. The dielectrophoretically aligned nanotube structures work as functional field-effect transistors. Several approaches to improving the contact resistances will be discussed. The work is supported by the NSEC program of the National Science Foundation under NSF Award Number CHE-0117752 and by NYSTAR.

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