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Hysteresis in single-walled carbon nanotube field–effect transistors: Experiments, a model, and implications S. KAR, Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy New York, S. TALAPATRA, Rensselaer Nanotechnology Center, Rensselaer Polytechnic Institute, Troy New York, A. VIJAYARAGHAVAN, Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy New York, C. SOLDANO, Department of Physics, Applied Physics and Astronomy, Rensselaer Polytechnic Institute, Troy New York, R. VAJTAI, Rensselaer Nanotechnology Center, Rensselaer Polytechnic Institute, Troy New York, S.K. NAYAK, Department of Physics, Applied Physics and Astronomy, Rensselaer Polytechnic Institute, Troy New York, O. NALAMASU, P.M. AJAYAN, Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy New York — Hysteresis in carbon nanotube FETs is understood to be due to charge injection from the nanotube to its surrounding dielectric. We present a simple yet effective model to understand and analyze this phenomenon, wherein the charge injection and its subsequent redistribution has been modeled as a series RC circuit. A set of experiments validates this model, and also fits previously published data by other groups. Our work provides an in-depth picture of the parameters, which play a crucial role in modifying the transfer characteristics in nanotube FETs under different experimental conditions.

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