Abstract Submitted
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Manipulating the charge state and conductance of a single molecule on a semiconductor surface by electrostatic gating[1] JESUS MARTINEZ-BLANCO, CHRISTOPHE NACCI, Paul-Drude-Institut fuer Festkoerperelektronik, Germany, STEVEN C. ERWIN, Naval Research Laboratory, U.S.A., KIYOSHI KANISAWA, NTT Basic Research Laboratories, Japan, ELINA LOCANE, MARK THOMAS, FELIX VON OPPEN, PIET BROUWER, Fachbereich Physik, Freie Universitaet Berlin, Germany, STEFAN FOELSCH, Paul-Drude-Institut fuer Festkoerperelektronik, Germany — We studied the charge state and tunneling conductance of single phthalocyanine molecules adsorbed on InAs(111)A using scanning tunneling microscopy (STM) at 5 K. On the InAs(111)A surface, native +1 charged indium adatoms can be repositioned by the STM tip using atom manipulation. This allows us to electrostatically gate an individual adsorbed molecule by placing charged adatoms nearby or, alternatively, by repositioning the molecule within the electrostatic potential landscape created by an STM-engineered adatom corral. By stepwise increasing the gating potential, the molecular charge state can be tuned from neutral to -1, as well as to bistable intermediate states. We find that the molecule changes its orientational conformation when the charge state is switched. Scanning tunneling spectroscopy measurements reveal that the conductance gap of the single-molecule tunneling junction can be precisely controlled by the electrostatic gating. We discuss the observed gating-dependent single-molecule tunneling conductance in terms of charge transport through a gated quantum dot.

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