Abstract

To achieve the Coulomb blockade, three criteria have to be met: Bias voltage shouldn’t exceed the charging energy; Thermal energy kBT (≈0.026eV) must be below the charging energy and the tunneling resistance should be higher than the resistance quantum (h/e2). The DNA base molecules Adenine (A), Cytosine(C), Thymine (T) and Guanine (G) were studied for the above conditions to verify their suitability to use in room temperature single electron devices. Charging energies or junction barriers as {LUMO- µ} and {µ - HOMO} for electron and hole transfer respectively are calculated using HF/STO-3G. The order for charging the bases for electron transport is A (0.65eV) < C (0.87eV) < G (0.95eV) < T (1.11eV) and for hole transport G (11.67eV) < C (11.92eV)