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Exciton Formation and Electroluminescence Quenching during 1D Impact Excitation of Carbon Nanotubes Field-Effect Transistors LAËTITIA MARTY, Regroupement Québécois sur les Matériaux de Pointe (RQMP) and Chemistry Department, University of Montreal, ELYSE ADAM, DAVID MÉNARD, RQMP and Physical Engineering Department, Ecole Polytechnique of Montreal, RICHARD MARTEL, RQMP and Chemistry Department, University of Montreal — There are few studies addressing the influence of excitonic effects on the electro-optical response of carbon nanotube (CNT) devices. We present here near infra-red electroluminescence (EL) from unipolar single- wall carbon nanotube field effect transistors (CNFETs) at high drain-source voltages. The conditions for emission at high field reveal that a single carrier type induces EL in CNFETs through a mechanism involving 1D impact excitation. Well-resolved spectra show that the emission is assigned to the radiative recombination of the $E_{1,1}$ exciton. An emission quenching is also observed at high field and attributed to an exciton-exciton annihilation process and free carrier generation. Excitons binding energy in the order of 270 meV for 1.4 nm CNTs is inferred from the spectral features..

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