Supporting Information for:

Auger Suppression of Nanotube Incandescence in Individual Suspended CNT *pn*-junctions

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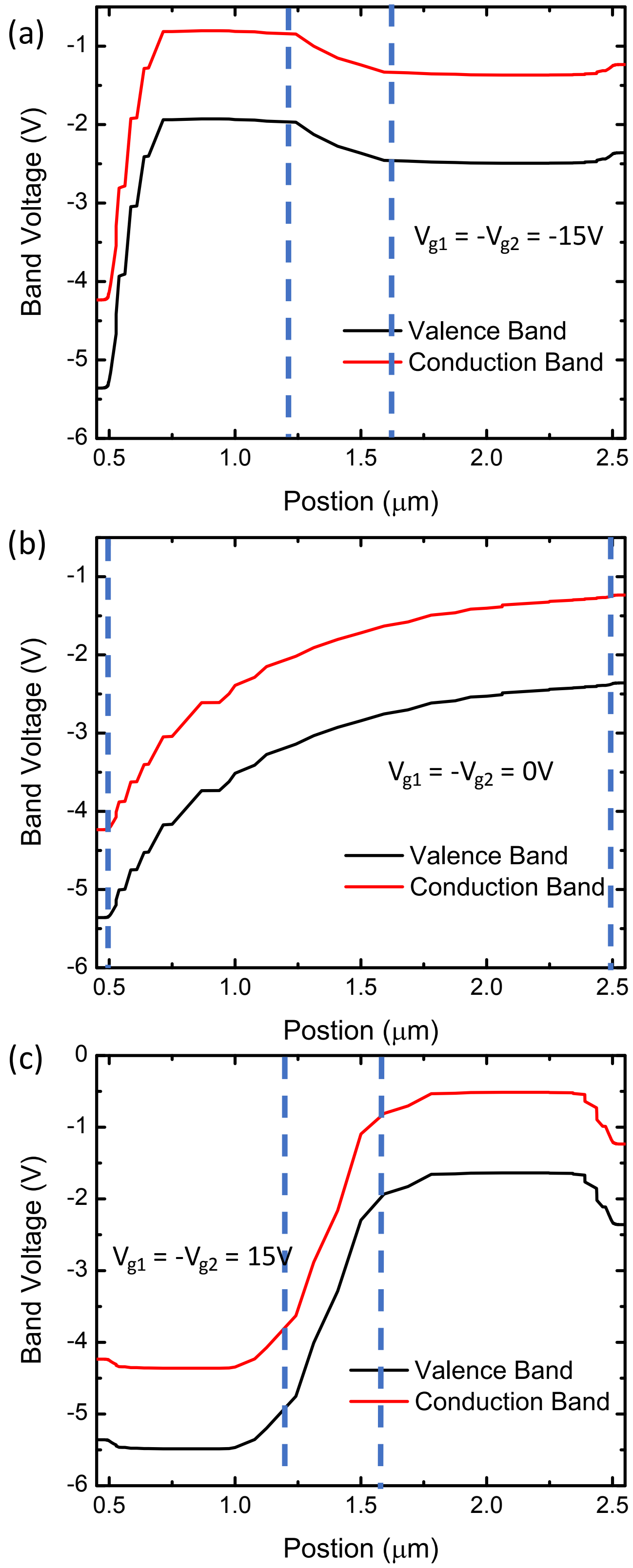

Figure S1. Calculated conduction and valence band profiles of a dual gate CNT FET device at (a) $V_{g1} = -V_{g2} = -15V$, (b) $V_{g1} = -V_{g2} = 0V$ and (c) $V_{g1} = -V_{g2} = 15V$ under a bias voltage of 3V. The formation of *pn*-juctions are labeled between dashed lines.

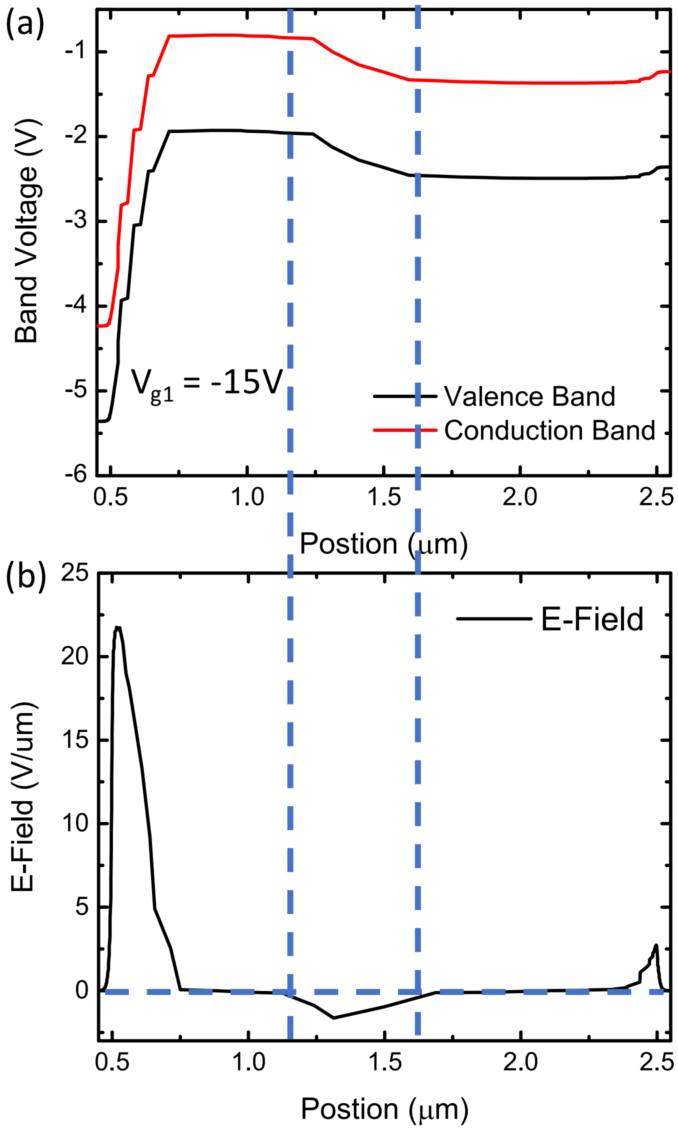

Figure S2. (a) Calculated conduction and valence band profiles and (b) electric field profile of a dual-gate CNT FET device at $V_{g1} = -V_{g2} = -15V$ with $V_b = 3V$.

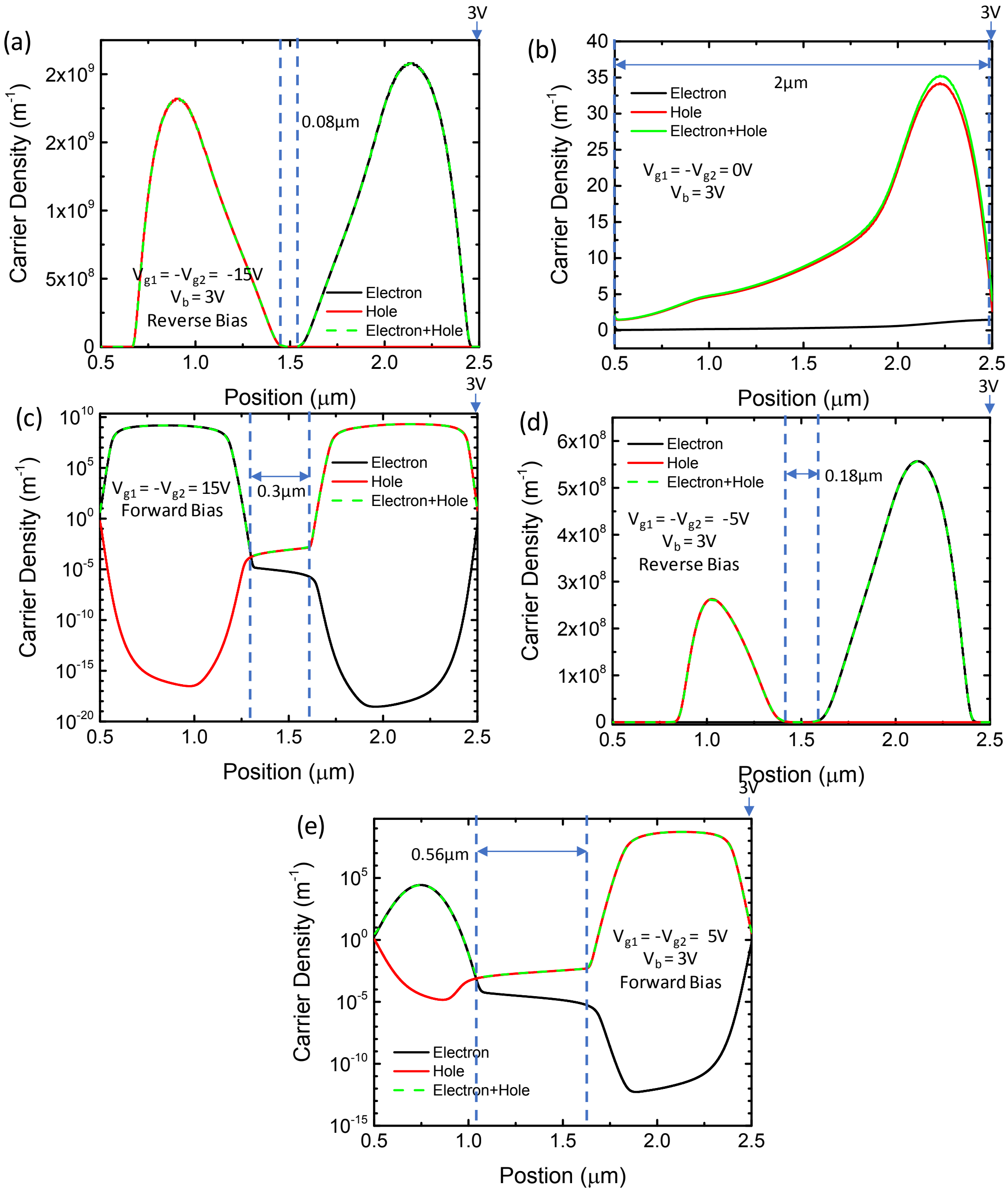

Figure S3. Calculated carrier density profile (a) V_{g1} = -V_{g2} = -15V, (b) V_{g1} = -V_{g2} = 0V and (c) V_{g1} = -V_{g2} = 15V (d) V_{g1} = -V_{g2} = -5V and (e) V_{g1} = -V_{g2} = 5V under a bias voltage of 3V. The intrinsic regions are labeled between dashed lines.

The intrinsic region is defined as the part with minimized induced charge within the CNT. The length of the intrinsic region is then calculated by measuring the distance between the two turning points of the region with smaller carrier densities from the carrier density profiles, as shown in Figure S3.

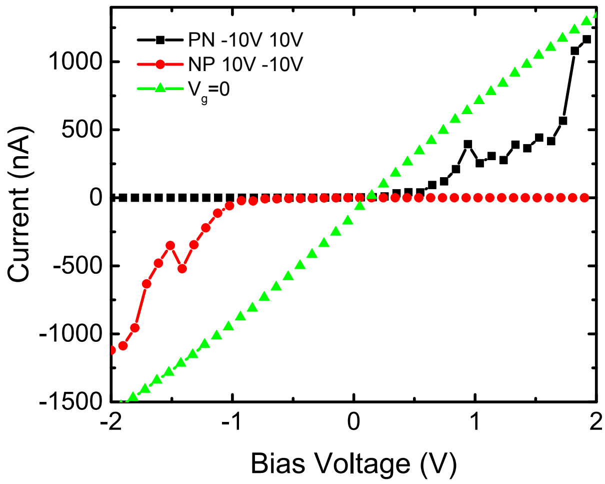

Figure S4. Current plotted as a function of bias voltage under different gate conditions taken from the same device shown in Figure 2.

Figure S4 shows the IV curves taken at different gate conditions. For zero gate voltage, the CNT remains p-type and it works as a resistor while it works as a diode when it is gated to forward biased region. Before a threshold bias voltage of around 2V, the conductance remains larger for zero gate condition.

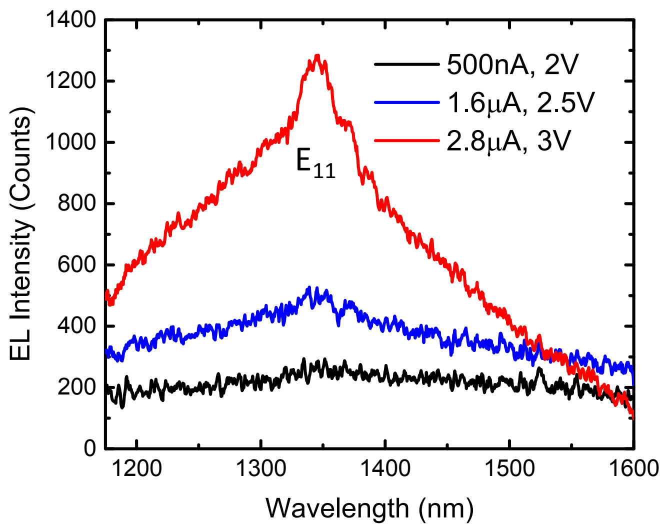

Figure S5. Light emission spectra taken from another dual-gate CNTFET device under different forward bias voltages around V_g=0.

Figure S5 shows spectra under different bias conditions of incandescence underlying the PL. Before the LED-like light emission (labeled E_{11}) becomes detectable at 3V, the light emission from hot carriers is extremely bright.

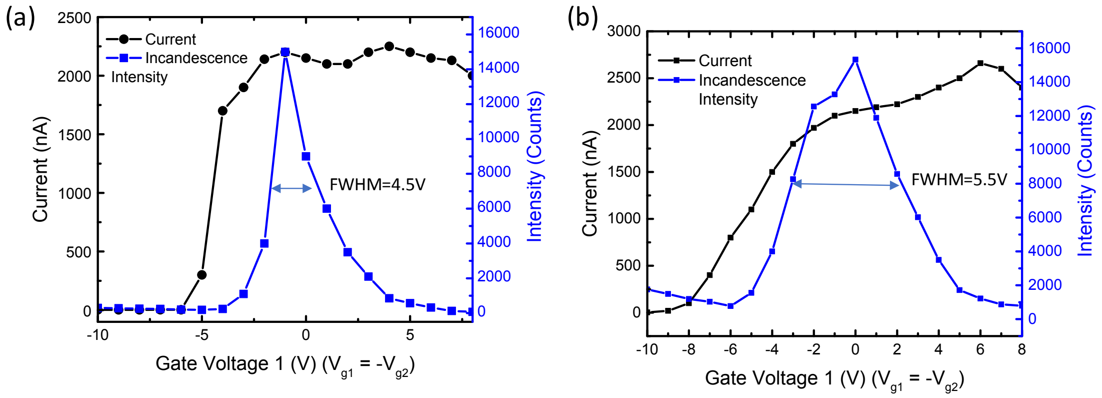

Figure S6. Current and EL intensity plotted as a function of gate voltage 1 with V_{g1} = -V_{g2} and V_{bias} = 3V shown as (a) Figure 2c and (b) Figure 3a in the manuscript.

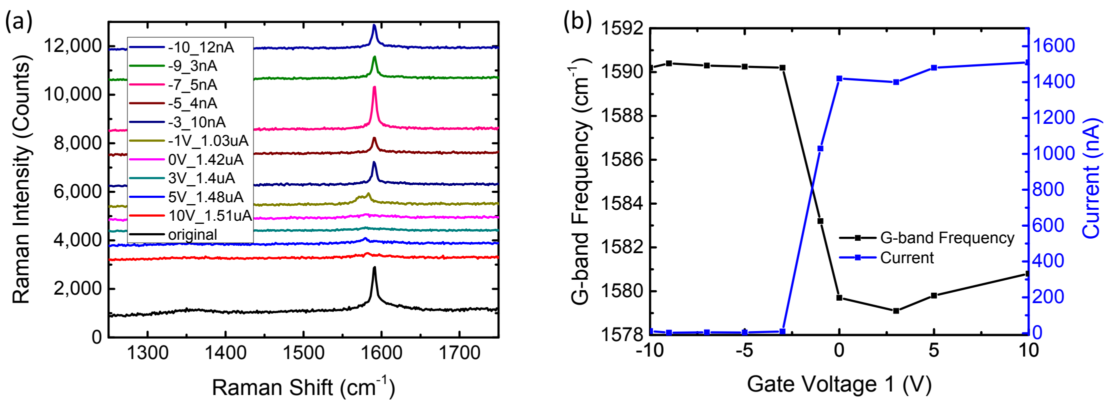

Figure S7. (a) Raman G band spectra taken from one dual-gate CNT FET device under different gate conditions (V_{g1} = -V_{g2}) at a constant bias voltage of 3V. (b) The Raman G band frequency and current plotted as a function of V_{g1} (V_{g1} = -V_{g2}).

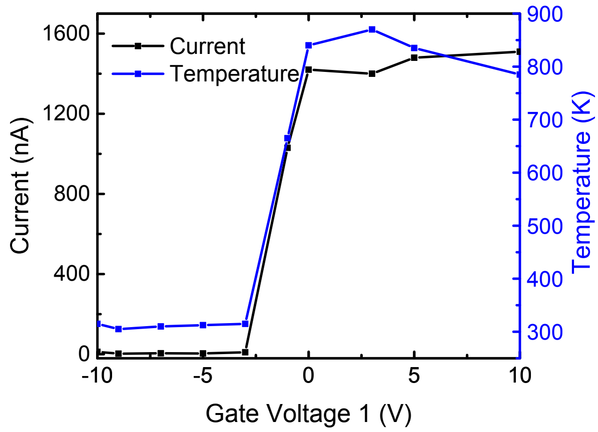

Figure S8. Electric current and estimated temperature plotted as a function of V_{g1} ($V_{g1} = -V_{g2}$).

Here, we use a G band Raman temperature-dependent coefficient of 0.02 cm^{-1}/K to estimate the temperature of the CNT[1, 2].

1. Hsu, I.K., R. Kumar, A. Bushmaker, S.B. Cronin, M.T. Pettes, L. Shi, T. Brintlinger, M.S. Fuhrer and J. Cumings, *Optical Measurement of Thermal Transport in Suspended Carbon Nanotubes.* Applied Physics Letters, **92**, 063119 (2008).
2. Hsu, I.K., M.T. Pettes, M. Aykol, L. Shi and S.B. Cronin, *The Effect of Gas Environment on Electrical Heating in Suspended Carbon Nanotubes.* Journal of Applied Physics, **108**, 084307 (2010).