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Electrostatic Simulation of Charge Trapping in Carbon Nanotube Vertical Organic Field Effect Transistors[1] JENNIFER CRAWFORD, ANDREW RINZLER, SELMAN HERSHFIELD, Univ of Florida - Gainesville — The carbon nanotube vertical organic field effect transistor is a vertical sequence consisting of a gate electrode, gate dielectric, thin nanotube network source electrode, organic semiconducting channel and finally the drain electrode. The drain current is modulated by the gate voltage which varies a Schottky barrier between source and channel layers. Hysteresis in the current-voltage characteristic has been observed when a electret charge trapping layer is placed between the nanotube source and the gate dielectric. We provide a model for charge injection into a trapping layer placed in contact with the carbon nanotube film and solve self-consistently for the electrostatics and the occupancy of the traps. For a range of applied gate voltages the simulations demonstrate hysteresis of the carbon nanotubes' charge as a result of the electric field produced by the trapped charge. This affects the current by modulating the Schottky barrier.

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