

Abstract Submitted
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Space-Charge-Limited Conduction Under Trap Density Gradient Exhibiting Bulk-Limited Diode¹ YUKIO WATANABE, Kyushu Univ. — Space-charge-limited (SCL) conduction in the presence of a trap density gradient is studied theoretically, which is compared with experiments in detail. Under this condition, the current (J) – voltage (V) characteristics at low voltage are ohmic and symmetric with respect to the bias polarity. At high voltage, JV characteristics follow the $J \propto V^m$ ($1 \leq m \leq 2$) law at both polarities and are asymmetric with respect to the bias polarity. These characteristics have not reported in the previous studies and agree well with experiments. This agreements verify that a bulk-limited conduction can exhibit rectifying, i.e., diode-like JV characteristics without relying on Schottky barriers and diffusion currents. The theory is presented in easily tractable algebraic recurrence formulae and reproduces experimental JV characteristics excellently using three free parameters, only one more than that used in standard SCL theory.

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