

Suppressing Ambipolar Conduction Using Dual Material Gate in Tunnel-FETs Having Heavily Doped Drain

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Abstract : In this paper, using 2D TCAD simulations, the application of a dual material gate (DMG) for suppressing ambipolar conduction in a tunnel field effect transistor (TFET) is demonstrated. Using the proposed DMG concept, the ambipolar conduction can be effectively suppressed even if the drain doping is as high as that of the source doping. Achieving this symmetrical doping, without the ambipolar conduction in TFETs, gives the advantage of realizing both n-type and p-type devices with the same doping sequences. Furthermore, the output characteristics of the DMG TFET exhibit a good saturation when compared to that of the gate-drain underlap approach. This improved behavior of the DMG TFET makes it a good candidate for inverter based logic circuits.

Keywords : dual material gate, suppressing ambipolar current, symmetrically doped TFET, tunnel FETs, PNP TFET

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