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題名	Impact of Switching Voltage on Complementary Steep-Slope Tunnel Field Effect Transistor Circuits
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概要	Impacts of switching voltage of a bilayer tunneling field-effect transistor (TFET) with extremely small subthreshold swing on energy consumption in static and dynamic circuits are investigated in this study. The TFET circuit simulation under an operating voltage of 0.3 V is performed by the simulation program with integrated circuit emphasis (SPICE) into which electricalcharacteristicsof the n- and p-channel bilayer TFETs calculated by device simulation are introduced. The static simulation of an inverter has clarified that the adjustment of the OFF-state voltage (VOFF), defined as a gate voltage at a drain current of 10−11 A/μm, to 0.08–0.14 V can be effective to suppress the short-circuit current. In contrast, when VOFF of the TFET is made close to 0 V according to the conventional manner of the VOFF adjustment, the energy consumption of the TFET inverter significantly increases because of the short-circuit leakage current. It is clarified from the dynamic simulation of a 11-stage ring oscillator (RO) that, as a result of this VOFF adjustment, the energy consumption of the TFET RO is comparable or even lower under high load capacitance than that of complementary metal–oxide–semiconductor(CMOS) RO, because of reduction in leakage current at a small expense of increase in the delay time. The present examination on VOFF adjustment can provide a new guideline of device design not only for TFETs but also for other steep-slope switching devices for future low-power internet-of-things (IoT) applications.