

Extended MASTAR modeling of DIBL in UTB and UTBB SOI MOSFETs

Abstract

This paper analyzes and models the drain-induced barrier lowering (DIBL) for ultrathin silicon body and ultrathin silicon body and thin buried oxide (UTBB) SOI MOSFETs. The channel depth appears as the primary factor in controlling DIBL when the substrate is in accumulation or inversion, whereas space-charge thickness in the substrate is the dominant parameter when the substrate is depleted. Under substrate depletion condition, UTBB devices lose their low DIBL features due to the increased coupling through the effective insulating layer underneath the transistor channel. The proposed model extending MASTAR equations is in agreement with experimental DIBL.