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Evidence of Real-Space Transfer in Buried-Channel Ge_xC_{1-x} Devices EN-SHAO LIU, Microelectronic Research Center, University of Texas at Austin, DAVID KELLY, Texas Instruments, JOSEPH DONNELLY, EMANUEL TUTUC, SANJAY BANERJEE, Microelectronic Research Center, University of Texas at Austin — We present experimental evidence of real-space transfer (RST) in buried-channel Ge_xC_{1-x} p-type metal-oxide-semiconductor field effect transistors (MOSFET) containing a Si cap layer. The output characteristics of these devices reveal a negative differential resistance (NDR) below 150K, at the onset of the saturation regime. This observation indicates a charge transfer from Ge_xC_{1-x} layer into the Si cap at sufficiently large drain bias values. The lower hole mobility of the Si cap with respect to the Ge_xC_{1-x}, translates into a drain current reduction, hence the observed NDR. Our low-field, temperature-dependent mobility measurements indeed reveal a higher effective carrier mobility in the buried-channel Ge_xC_{1-x} layer with respect to a Si-reference sample, which suggests that the observed NDR is caused by RST of holes from the Ge_xC_{1-x} into the Si layer.

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