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Ultra-thin ambipolar germanium on insulator field effect transistors D. KAZAZIS, B. R. PERKINS, A. ZASLAVSKY, Division of Engineering, Brown University, E. J. PREISLER, N. A. BOJARCZUK, S. GUHA, IBM T. J. Watson Research Laboratory — As semiconductor technology shifts towards semiconductor-on-insulator, material combinations other than Si/SiO_2 are becoming more attractive. We will report on the transistor characteristics of ultra-thin germanium layers (less than 100 Å) that have been epitaxially grown on a lattice matched epitaxial high-κ crystalline oxide $(La_{0.27}Y_{0.73})_2O_3$, in turn grown on (111) silicon substrate. This enables the use of Ge, which has higher electron and hole mobilities than Si. Our back-gated germanium on insulator field effect transistors show good transistor characteristics, especially for the very thin layers (30 Å). The devices exhibit a high I_{on}/I_{off} ratio and they can be fully depleted and inverted, enabling both P and N channel operation in the same device. Current-voltage measurements at room and low temperature will be presented and compared with device simulations. Hall effect measurements will be used to characterize the quality of the ultra-thin Ge channels.

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