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Electronic carrier transport at epitaxial oxide-semiconductor interfaces LIOR KORNBLUM, ERIC JIN, CHARLES AHN, FRED WALKER, Dept. of Applied Physics and Center for Research on Interface Structures and Phenomena, Yale University, New Haven, CT 06511, USA — The epitaxial growth of transition metal perovskite oxides on conventional semiconductors is a promising approach for integrating the wealth of electronic phenomena found in these oxides with existing devices and technologies. Some oxide functionalities require charge transport to and from the semiconductor, making the semiconductor-oxide interface an important focal point in the utilization of epitaxial oxides in electronic devices. We present our findings on electronic carrier transport in the conduction band of titanate perovskites ($R\mathrm{TiO_3}$) epitaxially grown on silicon and on germanium. Metal oxide semiconductor devices were fabricated by evaporation of metal contacts on top of epitaxially-grown oxides on semiconductors. Transport measurements show diode-like transport across the interface of some of the structures, whereas only leakage currents are observed in others. These results are discussed in light of the physical and electronic structure at the oxide-semiconductor interface.

Lior Kornblum
Dept. of Applied Physics and Center for Research on
Interface Structures and Phenomena, Yale University,
New Haven, CT 06511

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