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**Band offset engineering of 2DEG oxide systems on Si** ERIC JIN, LIOR KORNBLUM, DIVINE KUMAH, KE ZOU, Yale Univ, CHRISTINE BROADBRIDGE, Southern Connecticut State Univ, JOSEPH NGAI, Univ of Texas at Arlington, CHARLES AHN, FRED WALKER, Yale Univ — The discovery of 2-dimensional electron gases (2DEGs) at perovskite oxide interfaces has sparked much interest in recent years due to their large carrier densities when compared with semiconductor heterostructures. For device applications, these oxide systems are plagued by low room temperature electrical mobilities. We present an approach to combine the high carrier density of 2DEG oxides with a higher mobility medium in order to realize the combined benefits of higher mobility and carrier density. We grow epitaxial films of the interfacial oxide system $LaTiO_3/SrTiO_3$ (LTO/STO) on silicon by molecular beam epitaxy. Magnetotransport measurements show that the sheet carrier densities of the heterostructures scale with the number of LTO/STO interfaces, consistent with the presence of a 2DEG at each interface. Sheet carrier densities of 8.9 x $10^{14}$ $cm^{-2}$ per interface are measured. Band offsets between the STO and Si are obtained, showing that the conduction band edge of the STO is close in energy to that of silicon, but in a direction that hinders carrier transfer to the silicon substrate. Through modification of the STO/Si interface, we suggest an approach to raise the band offset in order to move the 2DEG from the oxide into the silicon.

Eric Jin
Yale Univ

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