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Interfacial engineering of optical absorption in epitaxial $LaCrO_3$-$SrTiO_3$ superlattices RYAN COMES, TIFFANY KASPAR, Pacific Northwest National Laboratory, STEVE HEALD, Advanced Photon Source, Argonne National Laboratory, MARK BOWDEN, SCOTT CHAMBERS, Pacific Northwest National Laboratory — $SrTiO_3$ (STO) is a wide-gap semiconductor well suited for photocatalytic H_2 production due to the alignment of its band edges with the half-cell energies of the H_2O redox reactions. However, the wide optical gap of STO (3.3 eV) makes the material an inefficient light absorber in the visible spectrum, preventing formation of electron-hole pairs needed for photocatalysis. Superlattice films comprised of alternating layers of band insulator $SrTiO_3$ and Mott insulator $LaCrO_3$ (LCO) have been theoretically predicted to offer intriguing optical properties due to the broken symmetry between the unoccupied Ti d_{xy} and Ti d_{xz} and d_{yz} orbitals. In this work, we examine the properties of LCO-STO superlattices grown with various periodicities on (La,Sr)(Al,Ta)O_3 (LSAT) (001) substrates using oxide molecular beam epitaxy. Films were characterized via *in situ* x-ray photoelectron spectroscopy to measure valence band structure and interfacial band bending. Polarized Ti and Cr K-edge x-ray absorption near edge spectroscopy was used to examine the bonding anisotropy. Spectroscopic ellipsometry measurements show the presence of interfacially-induced visible light absorption not found in either STO or LCO.

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