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Surface Electronic Structure of the Compositional Variants of SnO2(101) MATTHIAS BATZILL, JIMI BURST, KHABIBULAKH KATSIEV, Tulane University, ANNE CHAKA, National Institute of Standards, BERNARD DELLEY, Paul Scherrer Institut, ULRIKE DIEBOLD, Tulane University — Tin-dioxide finds widespread applications as a solid state gas sensing material and as a transparent conductor. Despite the importance of surfaces and interfaces in these applications the surface structure and composition of this material has not been extensively studied. In this contribution we show that the (101) surface exhibits a compositional transition from a Sn(IV)O_2-1x1 surface termination to a reduced Sn(II)O-1x1 composition if the oxygen chemical potential is lowered. The stability of the two surface phases is explained by the dual valency of Sn that stabilizes surfaces with Sn(II) as well as Sn(IV) surface species. ARUPS show the existence of a Sn-derived surface state for the oxygen deficient surface. Additionally, oxygen deficient surfaces have a $\sim$1eV lower work function than stoichiometric SnO_2 surfaces. This allows tuning of the band-alignment of hetero-layers with respect to SnO_2 electrodes in optoelectronic applications.

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