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**The Relationship Between Terminating Oxide Chemistry and InAs (100) Two-Dimensional Electron Gas (2DEG) Conductivity** KRISTEN COLLAR, Department of Physics, Duke University, Durham, NC, United States, WENYUAN JIAO, JINCHENG LI, WEI KONG, APRIL BROWN, Department of Electrical and Computer Engineering, Duke University, Durham, NC, United States — InAs generated much interest due to its small bandgap, high electron mobility and quasi-two dimensional electron gas (2DEG) which forms at the surface of oxidized and atomically-clean InAs. Electrical characterization of the 2DEG, particularly its correlation to oxide-InAs interface states is key to understanding the factors controlling conductivity. This study perturbs the oxide formation by investigating the dominating chemical reactions yielding the heterogeneous In- and As-based native oxide. Herein, we study the relationships between the conductivity and oxide surface chemistry of 100nm InAs films terminated with In or As monolayers using Molecular Beam Epitaxy then oxidized upon exposure to air. We speculate that the observed trends in the 2DEG conductivity are due to differences in the nature of predominate defects associated with oxide chemistries and their formation. Angle-resolved X-ray photoelectron spectroscopy revealed that In oxide was dominate at all probing depths, with more As oxide at the surface. Furthermore, an increase in incorporated oxygen degraded the mobility. Thus, we show that the surface termination impacts the 2DEG mobility and carrier concentration through the extent and homogeneity of oxygen incorporation during the formation of the oxide layer.

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