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Mobility-Electron Density Relation Probed via controlled Oxygen Vacancy Doping in Epitaxial $BaSnO_3$ KOUSTAV GANGULY, ABHINAV PRAKASH, TIANQI WANG, BHARAT JALAN, CHRIS LEIGHTON, University of Minnesota — The recently discovered high 300 K mobility in wide band gap semiconducting $BaSnO_3$ is of exceptional interest for perovskite oxide heterostructures. Critical issues in epitaxial films include determination of the optimal dopant, and understanding the mobility-electron density (μ-n) relation. These are addressed here through a transport study of $BaSnO_3$ films with oxygen vacancy doping controlled *via* reduction temperature. Single-phase, close-to-stoichiometric, smooth, epitaxial films were grown *via* high pressure oxygen sputter deposition. n at 300 K can be tuned from 510^{19} cm^{-3} to as low as 210^{17} cm^{-3}, which drives a weak- to strong-localization transition accompanied by a 10^4-fold increase in resistivity. This reveals $\mu \propto n^{0.65}$ over the entire n range probed, important for understanding mobility-limiting scattering mechanisms. La-doping has also been explored with this growth method; results at high electron density will be discussed, with a view to mobility optimization. Work supported by the NSF MRSEC under DMR-1420013.

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