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Carrier Density Modulation over an Exceptional Voltage Window in $BaSnO_3$ Films *via* Ion Gel Gating[1] HELIN WANG, JEFF WALTER, KOUSTAV GANGULY, ABHINAV PRAKASH, BHARAT JALAN, CHRIS LEIGHTON, University of Minnesota — $BaSnO_3$ has drawn interest recently due to its outstanding room temperature mobility and potential applications in oxide transistors, transparent conductors, *etc.* Here we report effective control of the electronic transport properties of sputtered oxygen-vacancy-doped $BaSnO_3$ ($BaSnO_{3-\delta}$) films *via* ion gel gating in electric double layer transistor structures. The electron densities of the starting films is tuned by thickness, from 4 10^{19} cm^{-3} at 13 nm to much lower densities at lower thickness. The response to gate voltage is found to be notably robust, with largely reversible response (even in vacuum) over an exceptionally wide window from -4 to +4 V, even at 300 K. The data support predominantly electrostatic response, unlike many other oxides, which we ascribe to Sn redox stability. In this manner the sheet resistance of 13-nm-thick $BaSnO_3$ films can be modulated by a factor of 50 at 300 K, increasing to almost 10^3 at low temperatures. Similar measurements at lower thickness/electron density will also be discussed.

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