Abstract Submitted
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**Electrically induced Metal-Insulator Transition in Nb/$NbO_2$/TiN Devices** YUHAN WANG, STUART.A WOLF, JIWEI LU, Univ of Virginia — Niobium dioxide ($NbO_2$) exhibits a metal insulator transition (MIT) as well as a structural transition at 1081 K. It has also been observed that an MIT could be induced by applied electrical field, which makes it attractive as potential electric and optical switch applications. A reactive bias target ion beam deposition (RBTIBD) technique was employed to synthesize Nb/$NbO_2$ thin films on TiN/Si substrates, in which the Nb top layer was used as the top electrodes. Electrically induced MIT was observed in the Nb/$NbO_2$/TiN devices, showing threshold characteristics. The electrically induced MIT was uni-polar with very minimal hysteresis behaviors and good reproducibility. Such transitions were observed up to 200 °C without obvious phase changes of $NbO_2$, indicating good thermal stability. We will discuss the evolution of electrical fields, current densities and input power at switching with the number of switches, as well as their dependence on the size of contacts. To study the possible effects from the interfaces between $NbO_2$ films and contacts, annealing processing in forming gas was conducted and transition behaviors were compared before and after annealing. The possible mechanisms for this induced MIT will be discussed.

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