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Self-sustained current oscillations in NbO_2 thin film vertical devices grown on TiN coated SiO_2/Si substrates using pulsed laser deposition [1] TOYANATH JOSHI, PAVEL BORISOV, Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506, USA, DAVID LEDERMAN, Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506, USA; Department of Physics, University of California, Santa Cruz, — Due to its relatively high MIT temperature (1081 K) and current-controlled negative differential resistance, NbO_2 is a robust candidate for memory devices and electrical switching applications. Highly stable and self-sustained current oscillations can be generated in NbO_2 thin films when attached to a constant voltage source. In this work, we present the self-sustained current oscillatory behavior of NbO_2 thin film vertical devices grown on TiN coated SiO_2/Si substrates using pulsed laser deposition (PLD). The formation of NbO_2 phase was confirmed by Grazing Incidence X-ray Diffractometry (GIXRD), X-ray Photoelectron Spectroscopy (XPS) and current vs. voltage measurements. Probe station tips (tip size ~2μm) and TiN bottom layer were used as top and bottom contacts. Current pulse measurements, performed in response to applied triangular voltage pulses, showed a non-linear threshold switching behavior for voltage pulse durations of 100 ns and above. Self-sustained current oscillatory behavior was obtained with frequencies ranging from 5 to 12.5 MHz from the film grown in lower (1 mTorr) and 10.5 - 14.8 MHz from the film grown in higher (10 mTorr) O_2/Ar mixed growth pressure (~7% O_2) while changing V_{pp} of the rectangular pulse voltage from 5 – 12.5 V and 10.5 – 14.8 V respectively.

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