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Supporting Information

Controlled Current Transport in Pt/Nb:$SrTiO_3$ Junctions via Insertion of Uniform Thin Layers of TaO_x

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r_{O2} dependence of the *I–V* characteristics of Pt/TaO_x/Nb:STO junctions

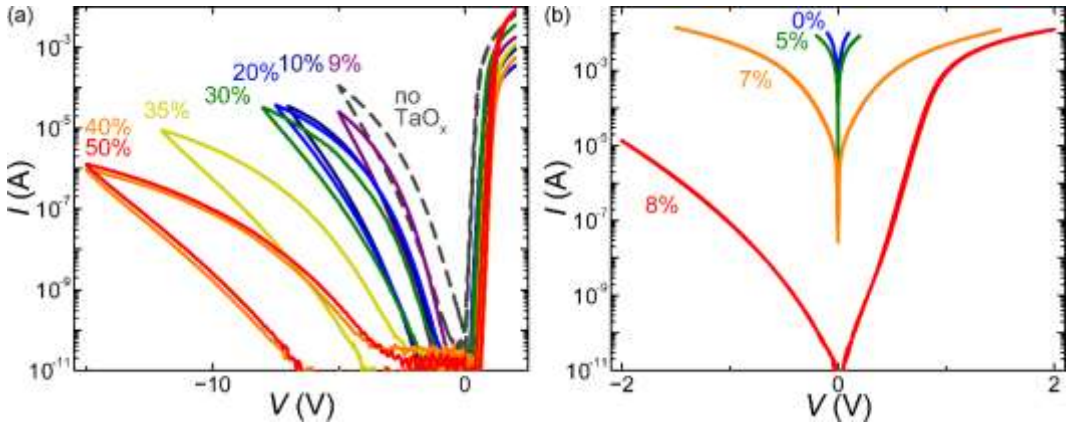


Figure S1. *I–V* characteristics of Pt/TaO_x(10 nm)/Nb:STO junctions with r_{O2} values of (a) 9–50% and (b) 0–8% for the TaO_x layers. The dashed curve in panel (a) represents the *I–V* characteristics of a non-engineered Pt/Nb:STO junction.

The detailed dependence of the *I–V* characteristics on r_{O2} for Pt/TaO_x(10 nm)/Nb:STO (0.05 wt% Nb) junctions is shown in Figure S1. At r_{O2} = 9%, which is around the expected stoichiometry borderline between x < 2.5 and x = 2.5, the *I–V* characteristics were similar to those of a Pt/Nb:STO junction (Figure S1(a)). For r_{O2} > 9%, the reverse bias currents showed systematic decreases as r_{O2} was increased, and increased resistive switching ratios were observed for the junctions. The changes in the reverse bias currents and the resistive switching ratio were smaller for r_{O2} = 10–30% and saturated for $r_{O2} \geq$ 40%. The r_{O2} dependence of the *I–V* characteristics is in agreement with that of the deposition rate of TaO_x (Figure 1(a)). For $r_{O2} \leq$ 8%, the *I–V* characteristics gradually started showing ohmic behavior with reduced rectification and resistive switching as r_{O2} was decreased (Figure S1(b)).