

Supporting Information

Nitrogen-Induced Enhancement of Synaptic Weight Reliability in Titanium-Oxide-based Resistive Artificial Synapse and Demonstration of Reliability Effect on Neuromorphic System

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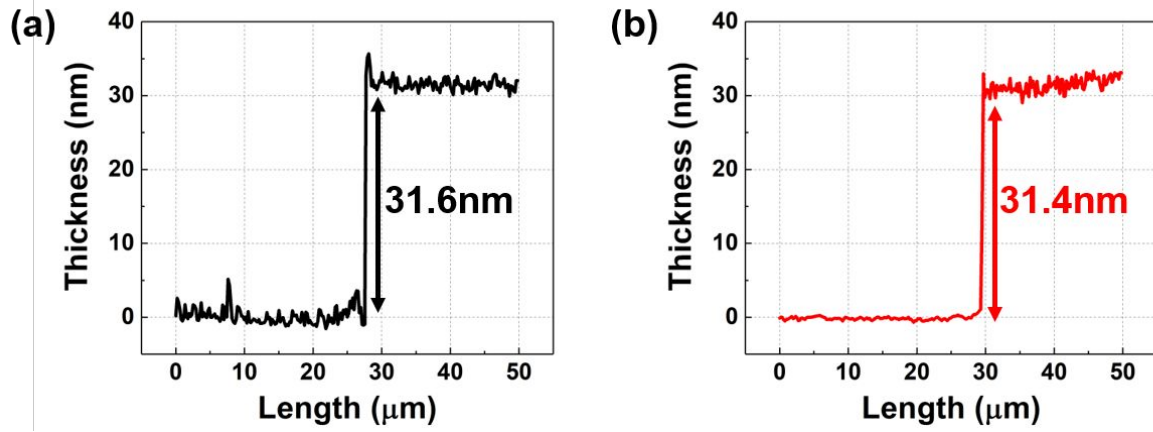


Figure S1. AFM data of (a) TiO_x and (b) $\text{TiO}_x\text{:N}$ active layer

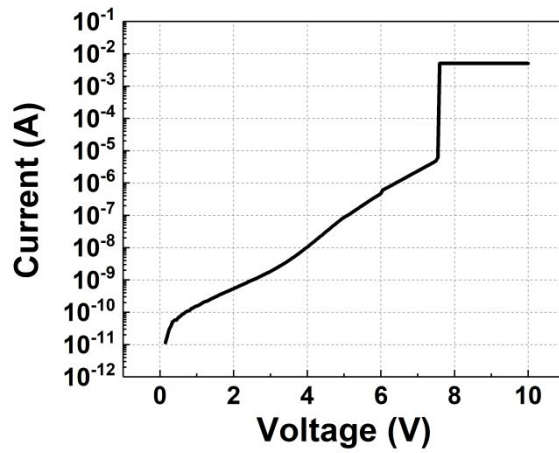


Figure S2. I–V characteristic of electroforming process of $\text{TiO}_x\text{:N}$ -based RAS

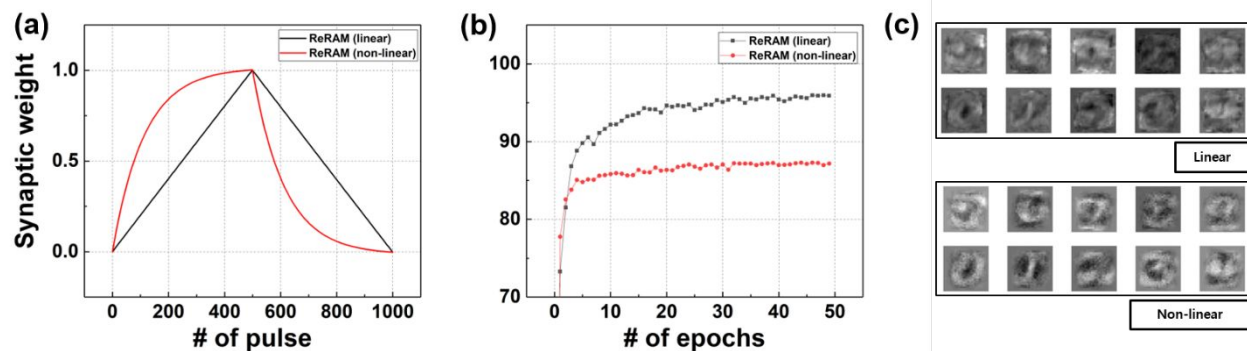


Figure S3. (a) exponential function that functionalized the potentiation and depression characteristics of the RAS; (b) pattern recognition accuracy as a function of the number of epochs with different linearity value; (c) synaptic weight map of 78600 synapses after training with different linearity on the simulation

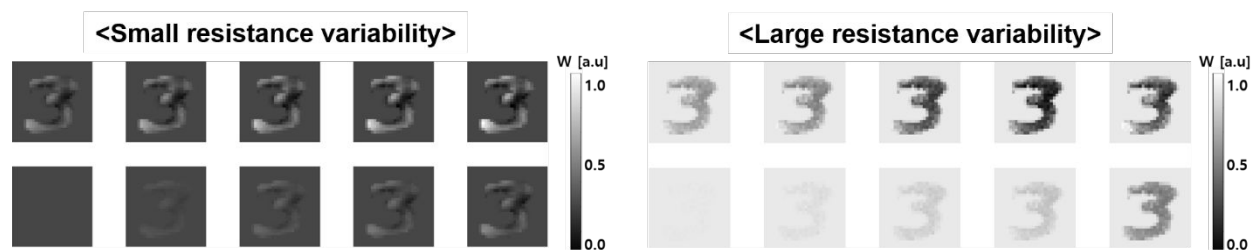


Figure S4. synaptic weight map of 78600 synapses after image recognition calculation on the simulation

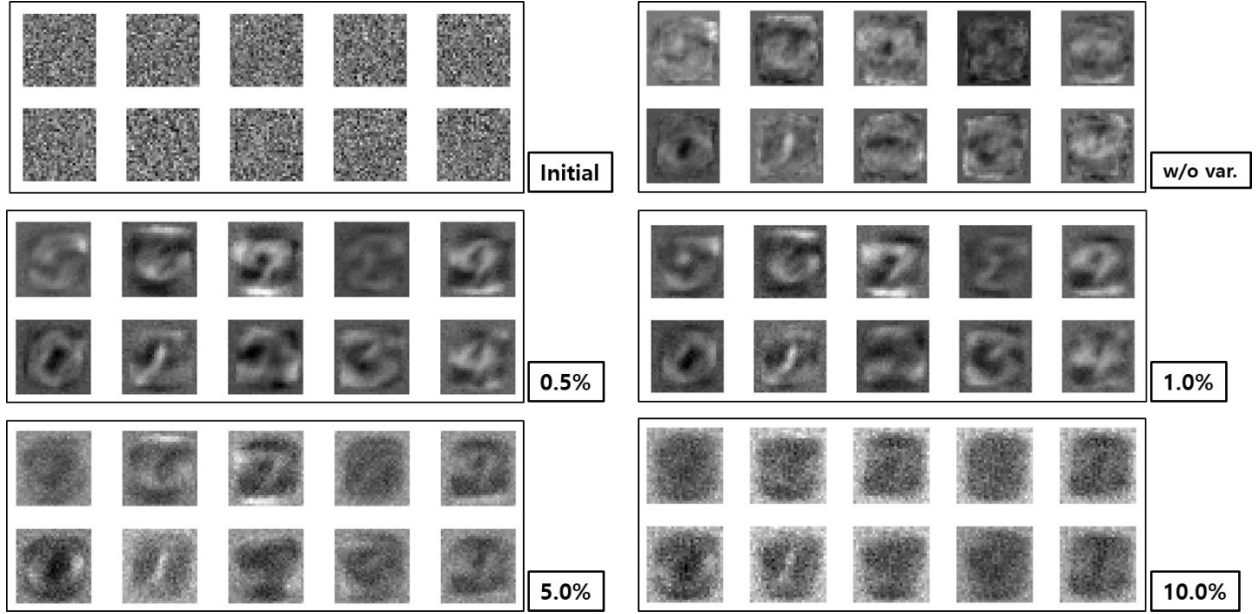


Figure S5. synaptic weight map of 78600 synapses after training without variability and with various values of variability on the simulation

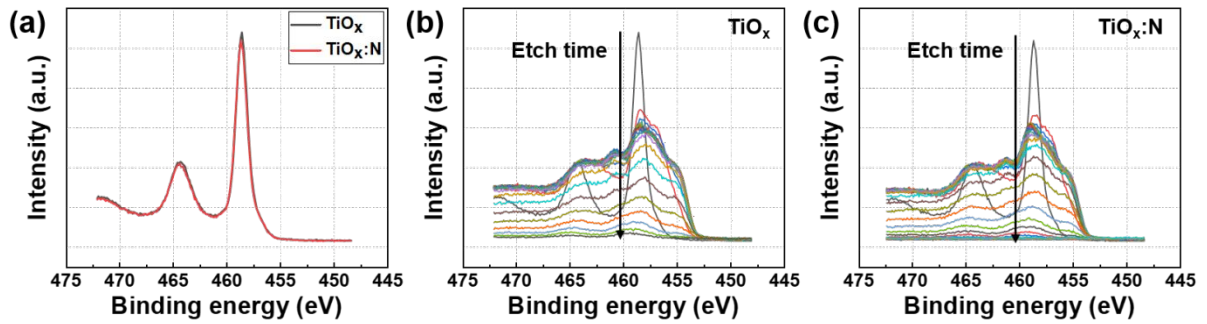


Figure S6. (a) Ti 2p peaks of as-dep TiO_x and $\text{TiO}_x\text{:N}$ films; (b) Ti 2p peaks of TiO_x through etch time; (c) Ti 2p peaks of $\text{TiO}_x\text{:N}$ through etch time

