Supplementary Information for

Synaptic Plasticity Realized by Selective Oxidation of TiS3 Nanosheet for Neuromorphic Devices

Jing-Kai Qin[a], Hai-Lin Sun[a], Pei-Yu Huang[a], Yang Li[b], Liang Zhen[a, b], Cheng-Yan Xu[a, b*]

[a] *Sauvage Laboratory for Smart Materials, School of Materials Science and Engineering, Harbin Institute of Technology (Shenzhen), Shenzhen 518055, China*

[b] *MOE Key Laboratory of Micro-Systems and Micro-Structures Manufacturing, Harbin Institute of Technology, Harbin 150080, China*

**E-mail addresses: cy_xu@hit.edu.cn*

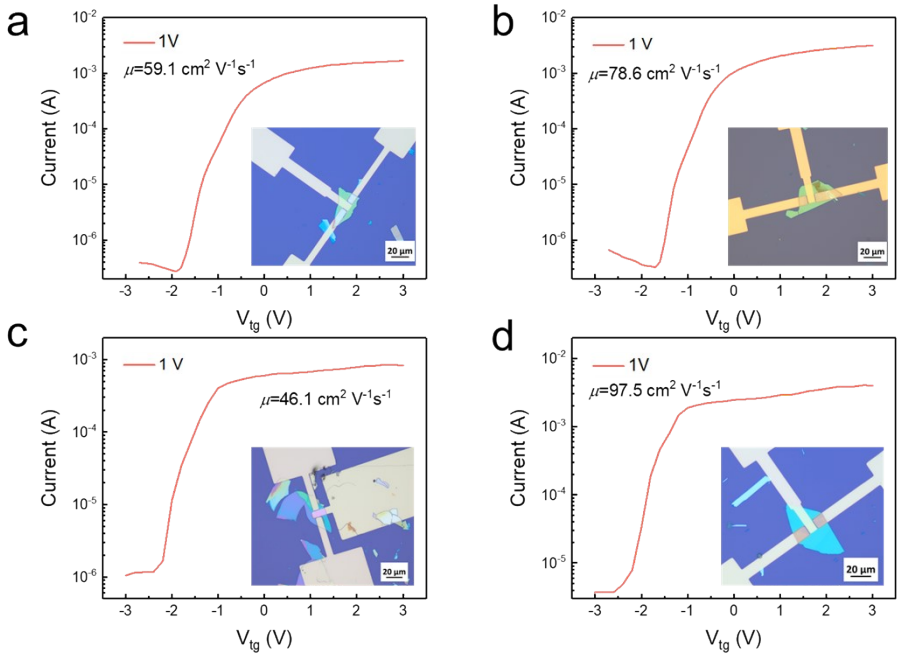

Figure S1. Photograph and transfer curves of typical device with mobility of (a) 59.1 cm^2 $V^{-1}s^{-1}$, (b) 78.6 cm^2 $V^{-1}s^{-1}$, (c) 46.1 cm^2 $V^{-1}s^{-1}$, (d) 97.5 cm^2 $V^{-1}s^{-1}$.

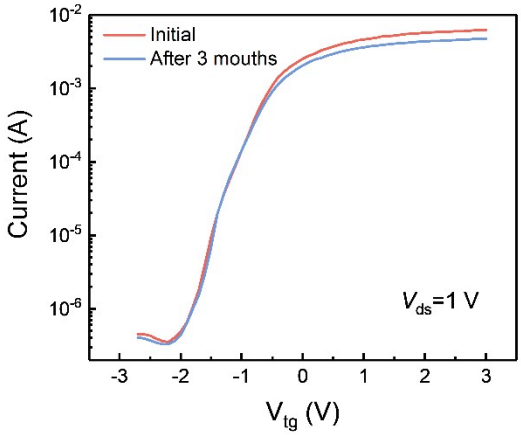

Figure S2. The environmental stability of TiS_3 field-effect transistor after exposure to air for 3 months.

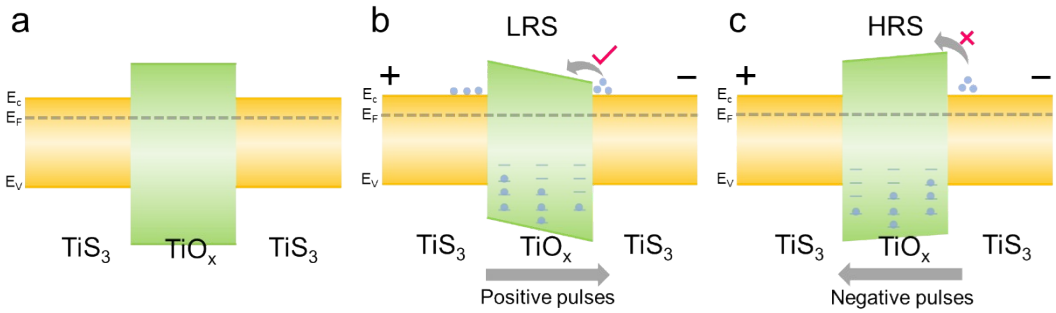

Figure S3. The energy band diagram of TiS_3-TiO_x-TiS_3 heterostructures (a) in initial state, (b) in LRS programmed by positive pulses, (c) in HRS programmed by negative pulses.

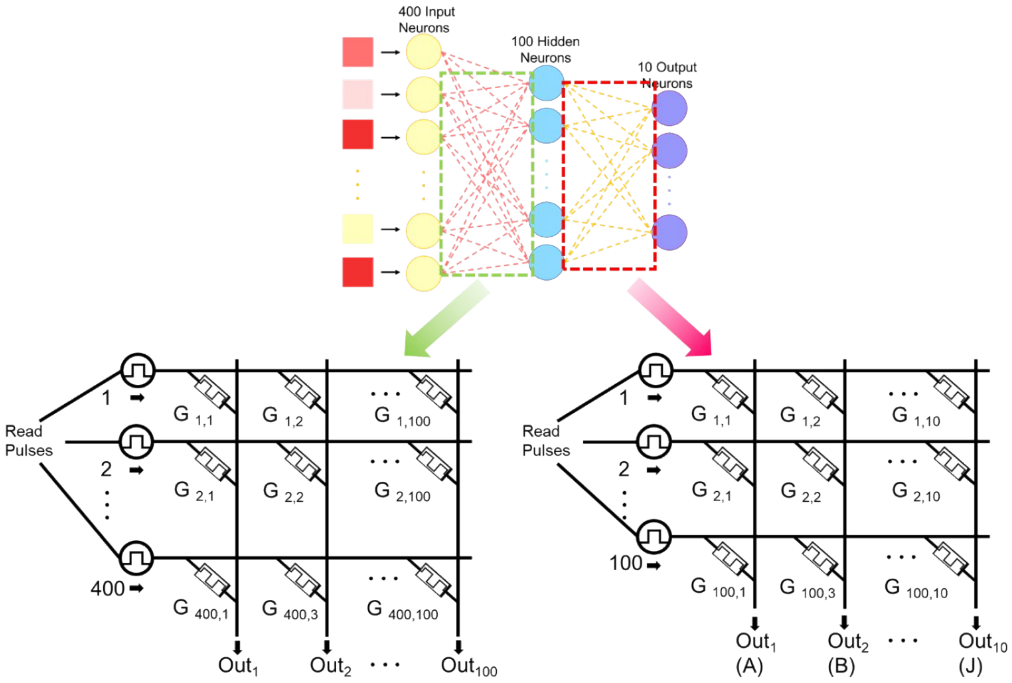

Figure S4. The corresponding schematic device array structure of ANN.