

Figure 1. (a) Schematic of binarized polarization as up and down states (P_{up} and P_{down}) and the current readout scheme of ferroelectric HZO capacitors for using as binarized synaptic devices. (b) Device-to-device variation of the binarized current level in ferroelectric HZO capacitors.

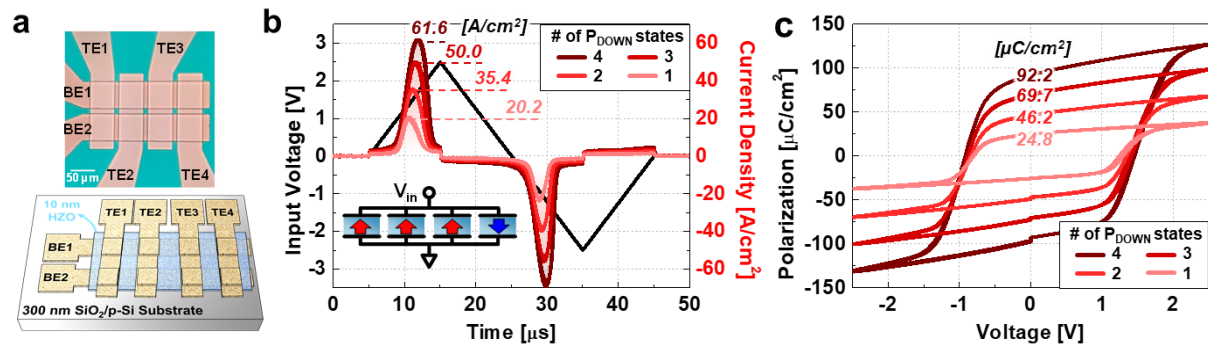


Figure 2. (a) Schematic and optical microscope image of 4×2 cross-point array of ferroelectric HZO capacitors. VMM operation of 4×2 cross-point array of ferroelectric HZO capacitors according to the number of P_{down} states with respect to the current-density (d) and polarization (e) properties.

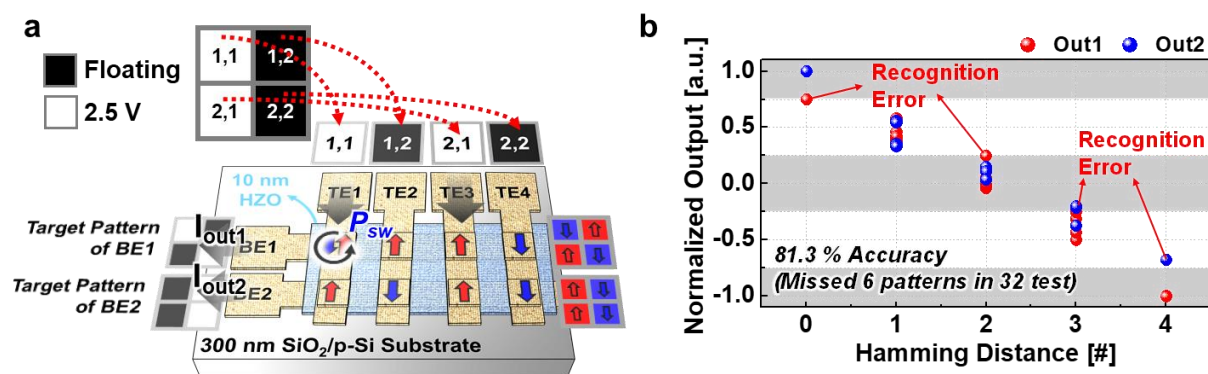


Figure 3. (a) Experimental demonstration method for 2×2 pattern recognition using 4×2 cross-point array. (b) The 2×2 pattern recognition results with respect to all occurrences of input patterns.