Supplementary Information

Memory Effect and Coexistence of Negative and Positive Photoconductivity in Black Phosphorus Field Effect Transistor for Neuromorphic Vision Sensors

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Figure S1 (a) depicts the transistor current throughout a sequence of pulses applied to the gate ($V_{\text{gs}} = \pm 20 \text{ V}$) at pressure of 2 mbar. Similarly, Figure S1 (b) shows the transistor current after $V_{\text{gs}} = \pm 20 \text{ V}$ pulses, at the lower pressure of $10^{-5} \text{ mbar}$. The transient memory response of the device is compared across various temperatures, at fixed $V_{\text{ds}} = 100 \text{ mV}$ and at the pressures of 2 mbar and $10^{-5} \text{ mbar}$, respectively.

![Figure S1](image)

Figure S1. (a) SET/RESET/READ cycles at different temperatures and under 2 mbar pressure; (b) SET/RESET/READ cycles at different temperatures and under $10^{-5} \text{ mbar}$ pressure.

In Figure S2 it is shown the slow decay of the transistor current after illumination (persistency). The current returns to the pristine dark level in a time exceeding 8000 s.

![Figure S2](image)

Figure S2. Transient photocurrent measurement with a decay recorded up to 8000 s. The inset shows the same plot with the time on logarithmic scale.