Supporting Information

Supplementary Note 1: The contact between metal electrode and semiconductor.

The linear and sub-linear *I-V* curves in darkness reveal that the Al-$ZnGa_2O_4$-Al and Pt-$ZnGa_2O_4$-Pt structures exhibit ohmic and Schottky contacts, respectively, at their Al/$ZnGa_2O_4$ and Pt/$ZnGa_2O_4$ interfaces.

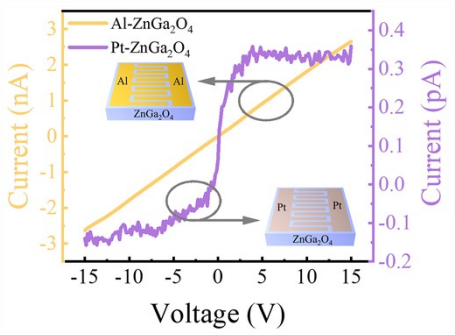

Figure S1. *I-V* curves of Al-$ZnGa_2O_4$-Al and Pt-$ZnGa_2O_4$-Pt device in the dark (inset shows a schematic diagram of the device).

Supplementary Note 2: The *I-V* characteristic curves of symmetrical electrodes in a dark state at different temperatures.

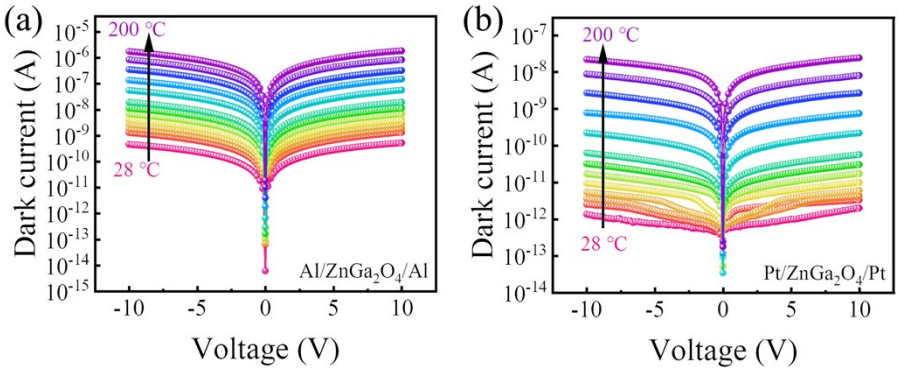

Figure S2. *I-V* characteristic curves at different temperatures of Al-$ZnGa_2O_4$-Al and Pt-$ZnGa_2O_4$-Pt devices in the dark

Supplementary Note 3: The effect of 255 nm light irradiation at different background light intensities on the spike current of the device.

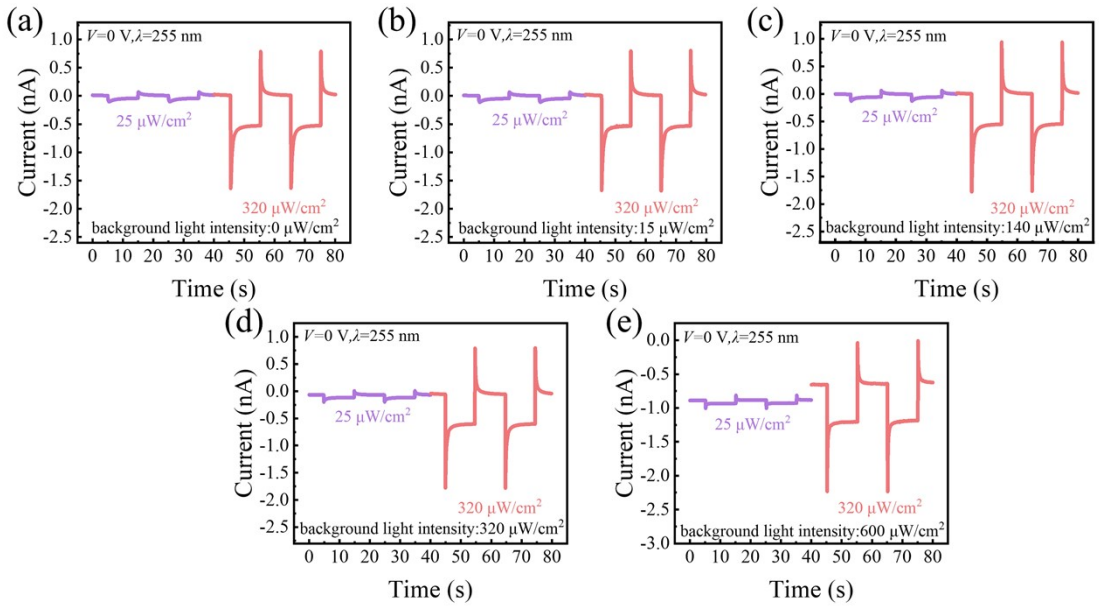

Figure S3. *I-t* characteristic curves of the device under different intensities of 255 nm background illumination.