Supporting Information

Template-Confined Growth of Ruddlesden-Popper Perovskite Micro-Wire Arrays for Stable Polarized Photodetectors

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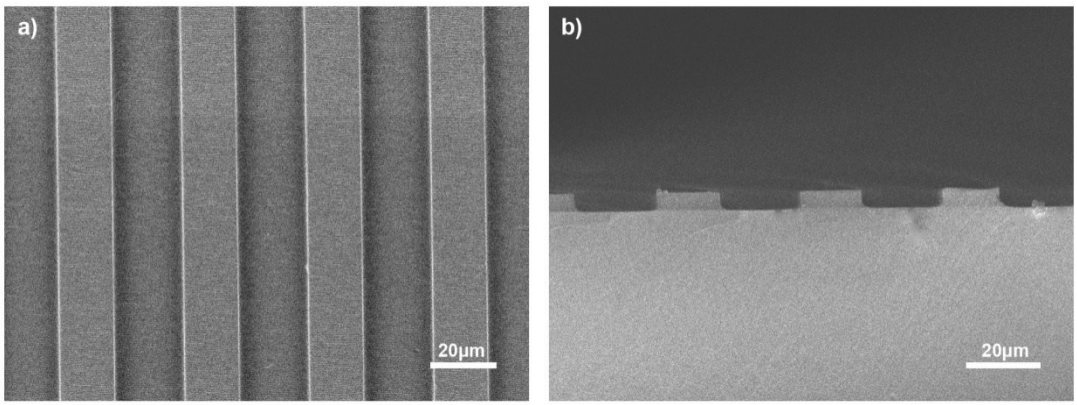

Figure S1. The scanning electron microscope (SEM) images of PDMS template with micron-sized periodic strip groove structures. a) Top view SEM image. b) Cross section SEM image.

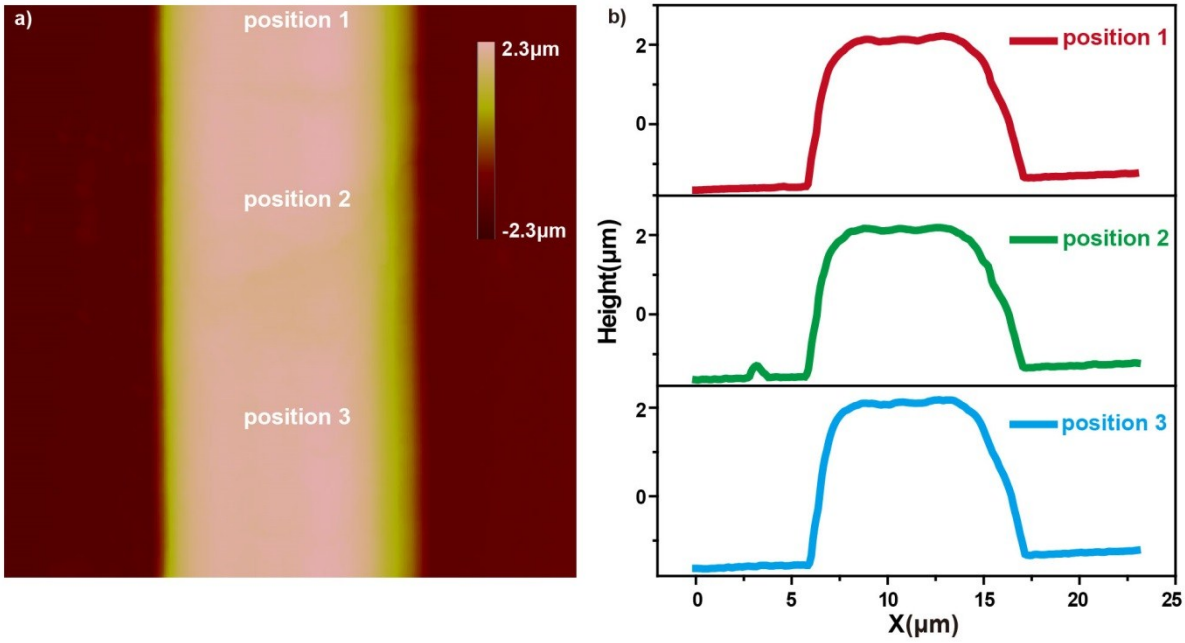

Figure S2. The atomic force microscopy (AFM) image and the height distribution at three different positions of one single micro-wire.

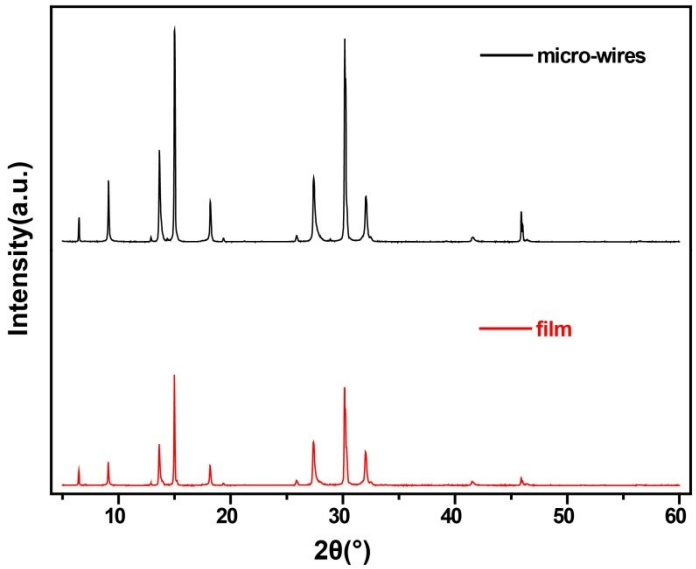

Figure S3. XRD pattern of the 2D layered perovskite micro-wire arrays and the thin film with n value of 4.

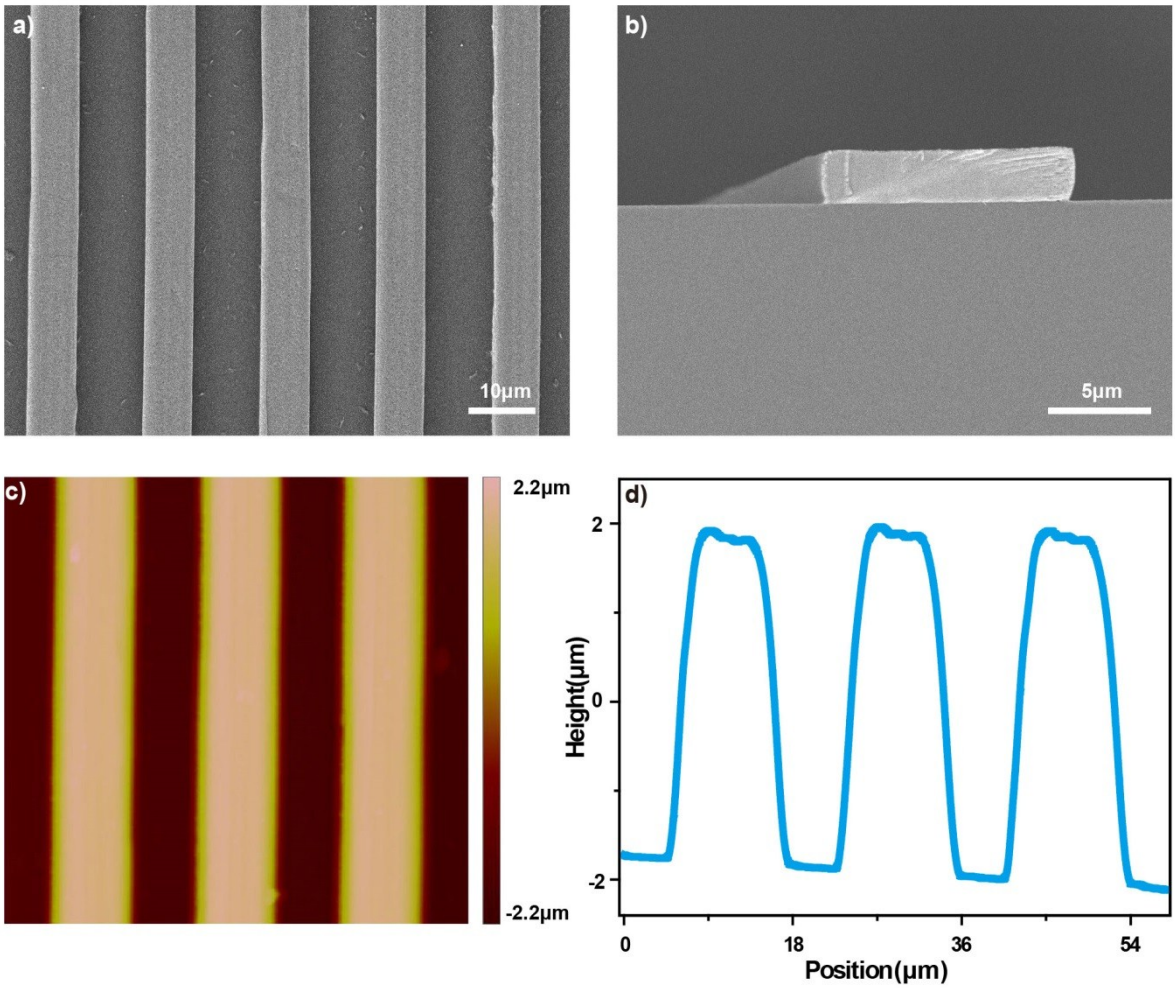

Figure S4. Characterizations of the 2D layered perovskite micro-wire arrays with n value of 2.a) The SEM image of the 2D layered perovskite micro-wire arrays with n value of 2. b) The SEM image of the cross section of one single micro-wire. c) The AFM image and d) the height distribution.

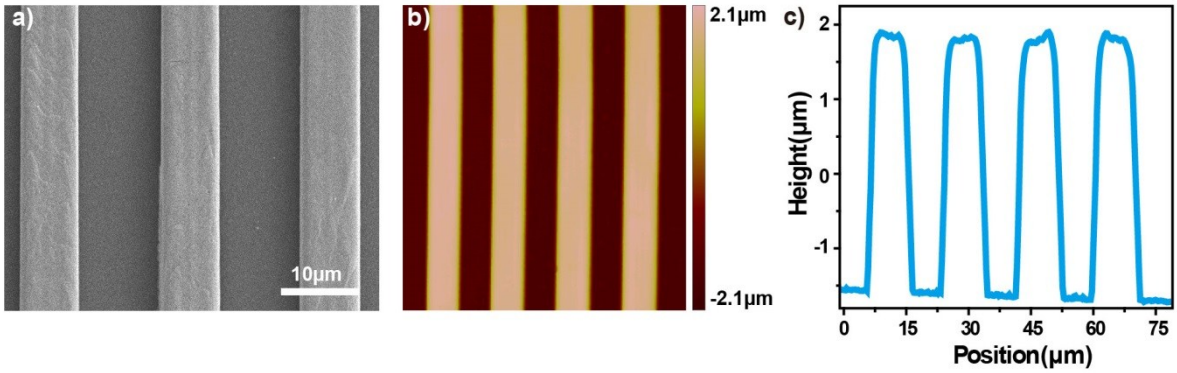

Figure S5. Characterizations of the 2D layered perovskite micro-wire arrays with n value of 3.a) The SEM image of the 2D layered perovskite micro-wire arrays with n value of 2. b) The AFM image and c) the height distribution.

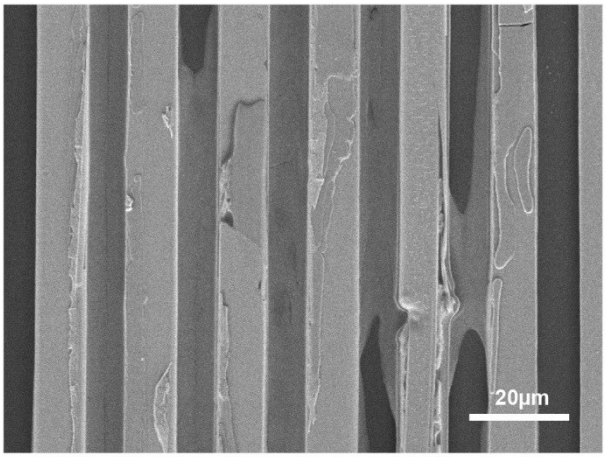

Figure S6. The SEM image of the 2D layered perovskite micro-wire arrays when the glass substrate was not subjected to plasma treatment.

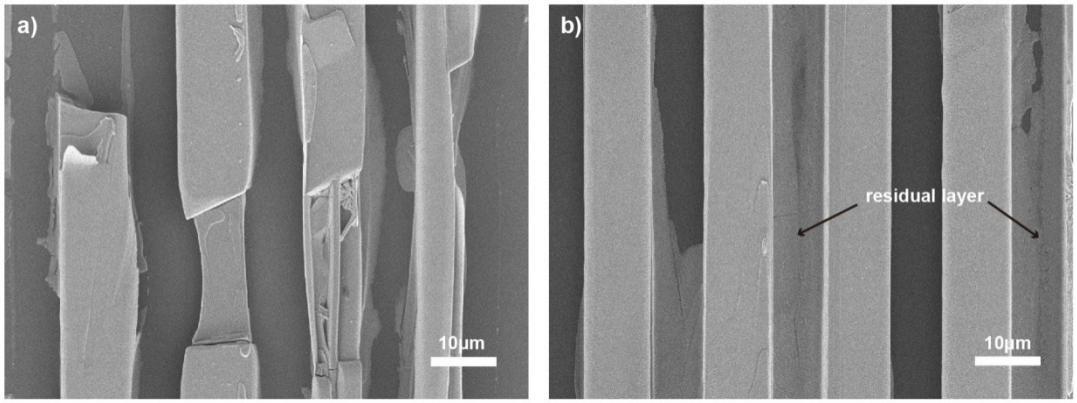

Figure S7. a) Discontinuous micro-wirearrays obtained with a low concentration of 5 wt%. Micro-wirearrays with residual layers obtained with high concentration of 40 wt%.

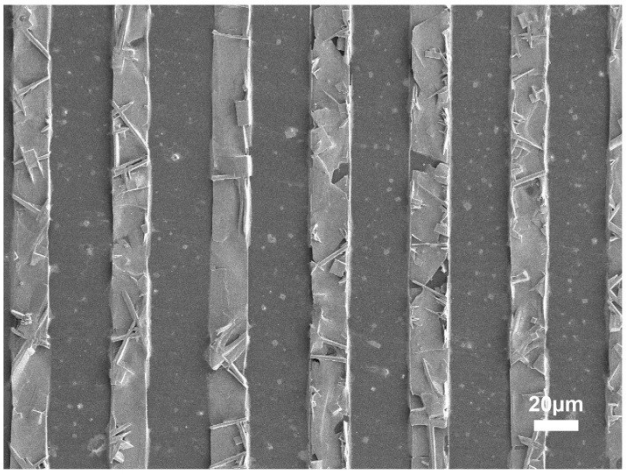

Figure S8. A SEM image of the crystals obtained at 110 °C.

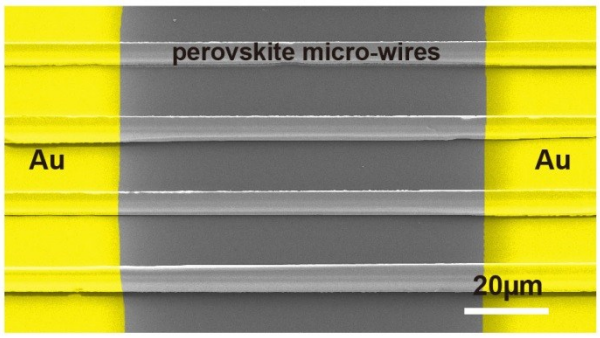

Figure S9. SEM image of the perovskite micro-wire based device.

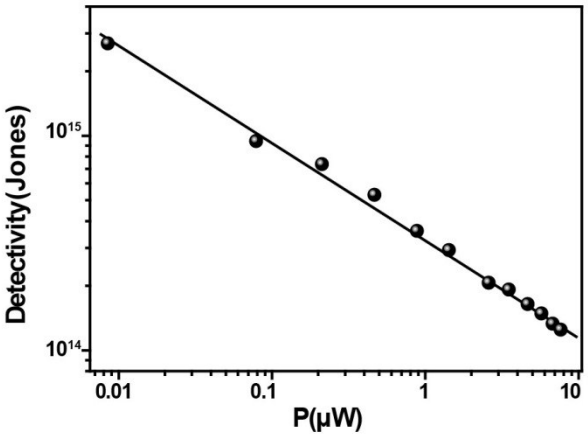

Figure S10. Detectivity of the device under different incident power.

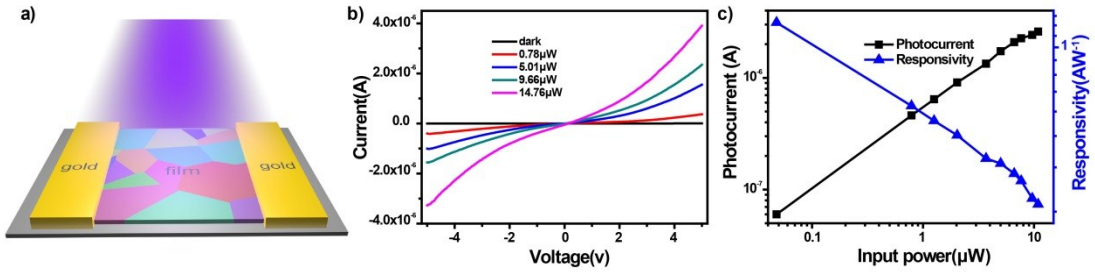

Figure S11. Performance of the photodetector based on thin film with n value of 4. a) A schematic diagram of the photodetector. b) IV curves of the photodetector when illuminated by a 365nm laser with different intensity. c) The photocurrent and the responsivity of the device when illuminated by a 365nm laser with different intensity.

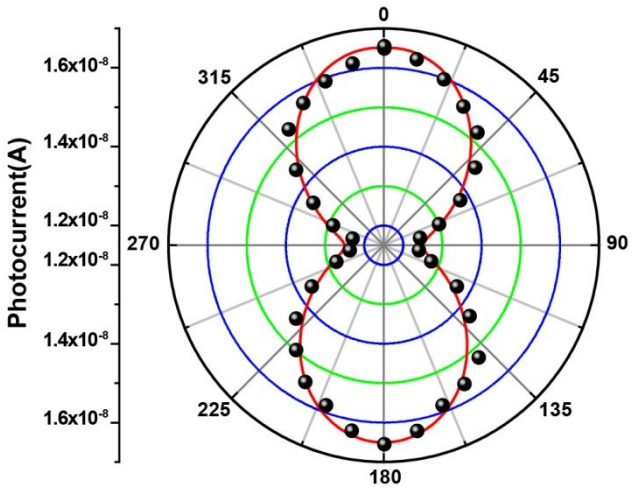

Figure S12. Photocurrent of the photodetector based on the 2D layered perovskite micro-wire arrays with n value of 2 when irradiated by incident light at different polarization angles.

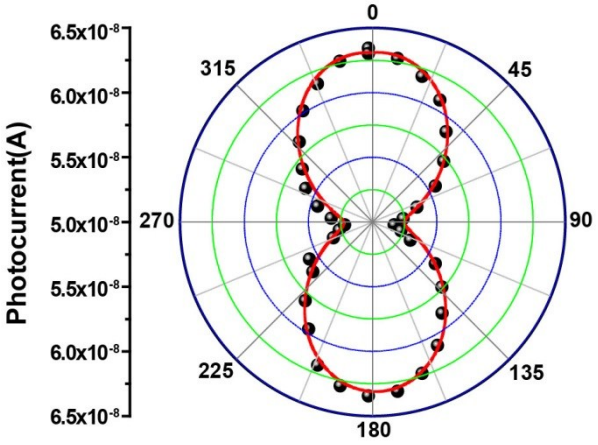

Figure S13. Photocurrent of the photodetector based on the 2D layered perovskite micro-wire arrays with n value of 3 when irradiated by incident light at different polarization angles.

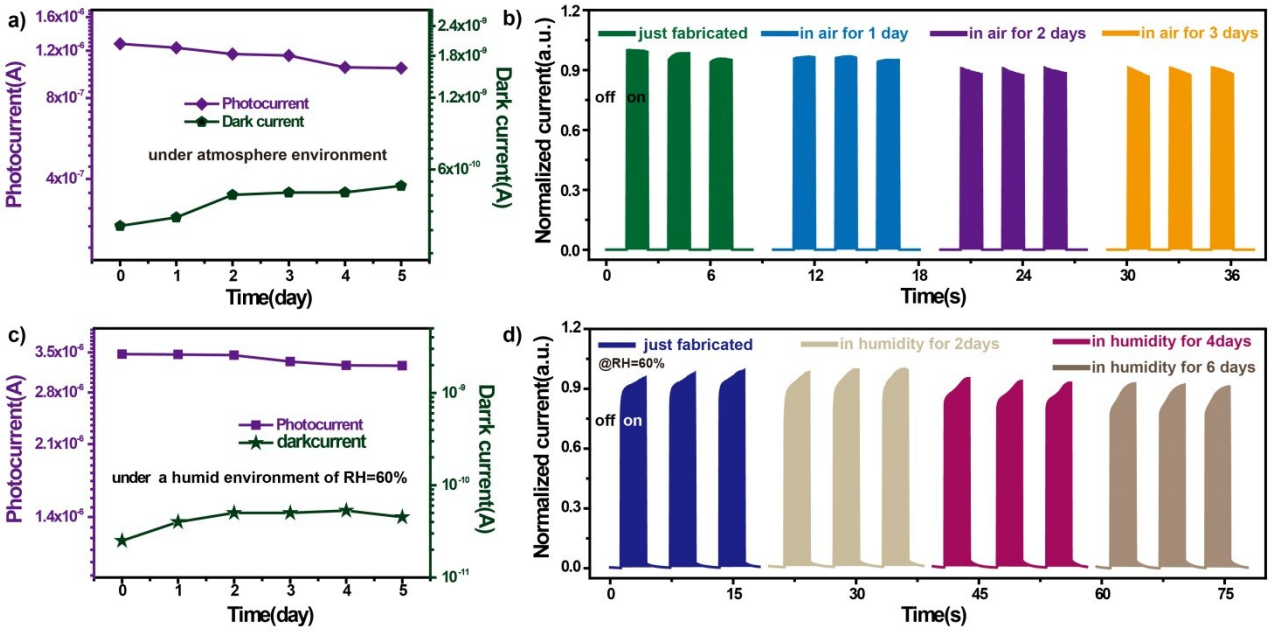

Figure S14 a) Variation of photocurrent and dark current of the device with time when exposed in atmosphere environment. b) Photo response of the device after being exposed in atmosphere environment for several days. c) Variation of photocurrent and dark current of the device with time when exposed in an environment of 60% relative humidity. d) Photo response of the device after being placed in an environment of 60% relative humidity for several days.