Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary information

A Novel Visible Light Sensing and Recording System Enabled by Integration of Photodetector and Electrochromic Devices

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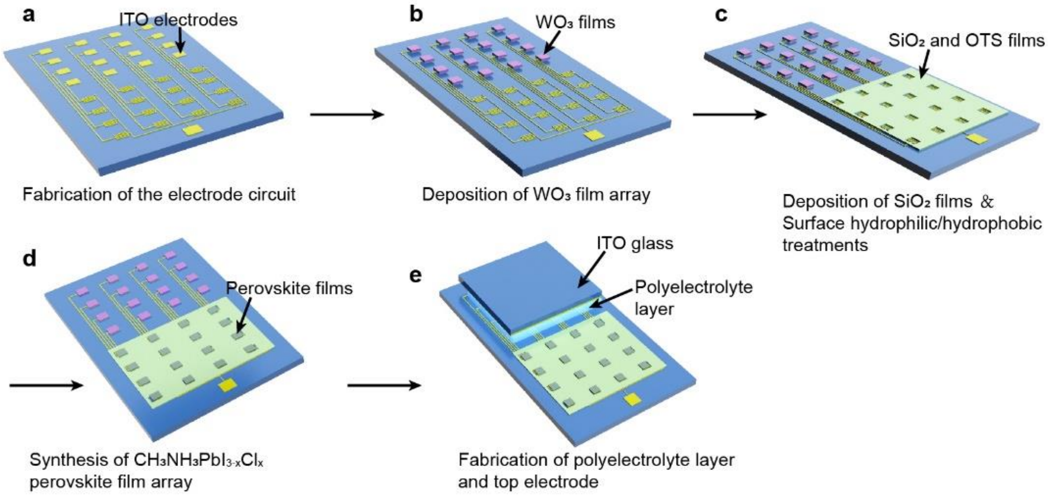

Fig. S1. Schematic illustration of the fabrication process of the visible sensing and recording system. (a) Fabrication of the electrode circuit. (b) Deposition of WO_3 film array. (c) Surface hydrophilic/hydrophobic treatments for synthesizing perovskite film array. (d) Synthesis of $CH_3NH_3PbI_{3-x}Cl_x$ perovskite film array by a two-step sequential deposition method. (e) Fabrication of the polyelectrolyte layer and top electrode.

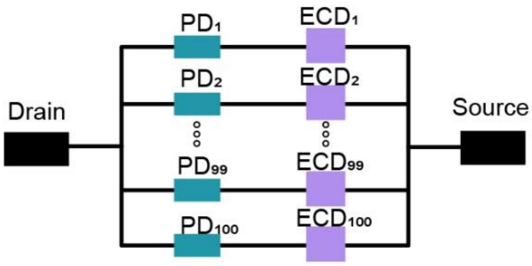

Fig. S2. The equivalent circuit diagram of the pixel connecting mode between PD and ECD.

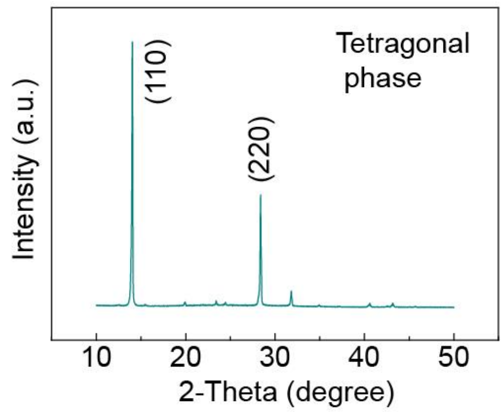

Fig. S3. The X-ray diffraction of as-synthesized $CH_3NH_3PbI_{3-x}Cl_x$ perovskite shows the tetragonal structure.

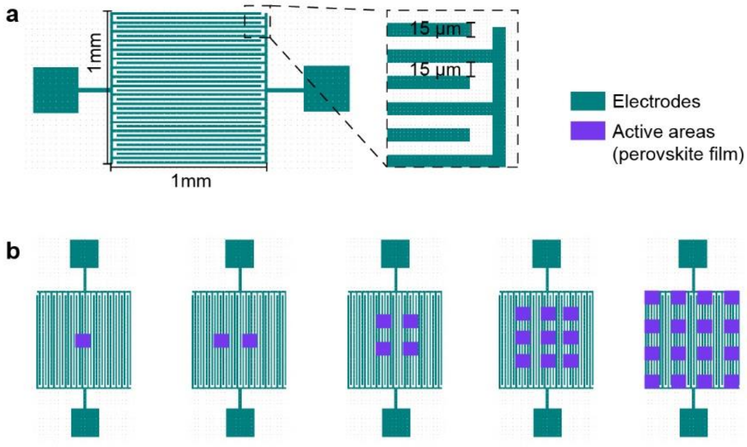

Fig. S4. (a) The structure of interdigital electrode. (b) Five types of PD with the single-pixel areas of 0.04 cm^2, 0.08 cm^2, 0.16 cm^2, 0.36 cm^2, 0.64 cm^2, respectively.

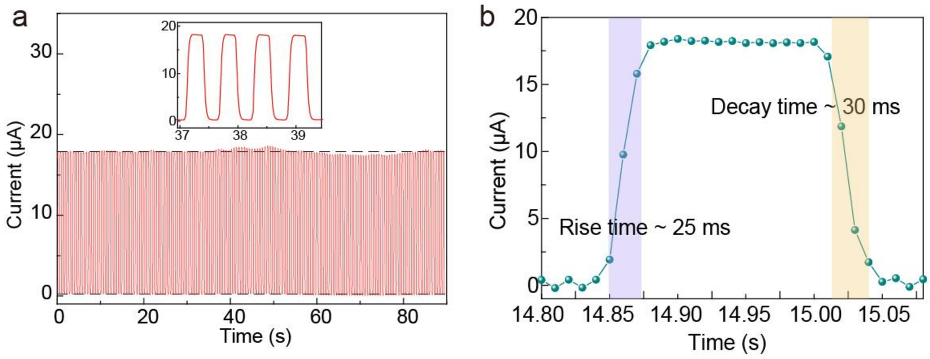

Fig. S5. (a) The photoswiching characteristic of the PD with the single-pixel area of 0.64 cm^2. (b) The rise time and the decay time of the PD were estimated as 25 ms and 30 ms, respectively.

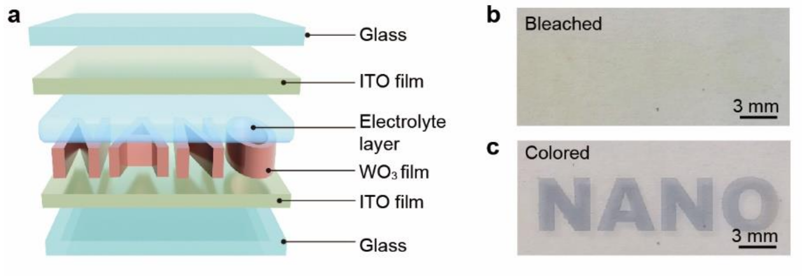

Fig. S6. The ECD in the colored state realized the display of a “NANO” pattern by designing the shape of the WO_3 films. (a) The designed structure of ECD. (b-c) The photographs of the device in bleached and colored states, respectively.

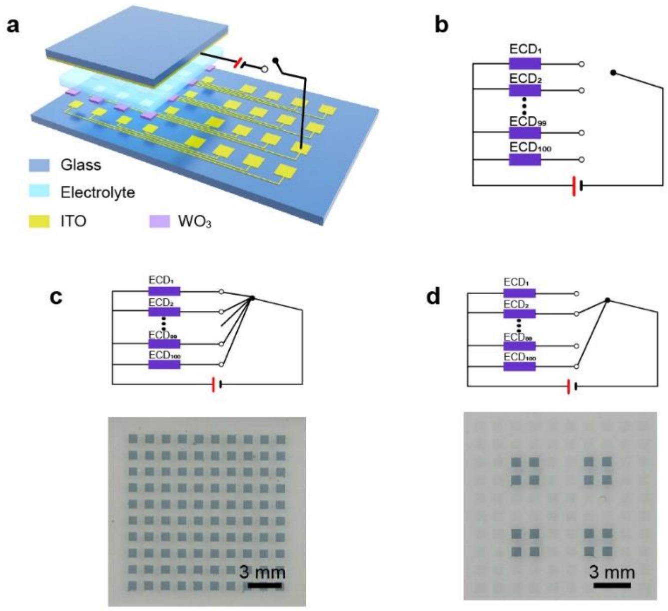

Fig. S7. (a) Schematic illustration of the structure of the ECD array. (b) The equivalent circuit diagram of the ECD array. (c) When all channels were connected, all pixels can be colored. (d) The pixels in the ECD array were selectively colored through connecting corresponding channels.

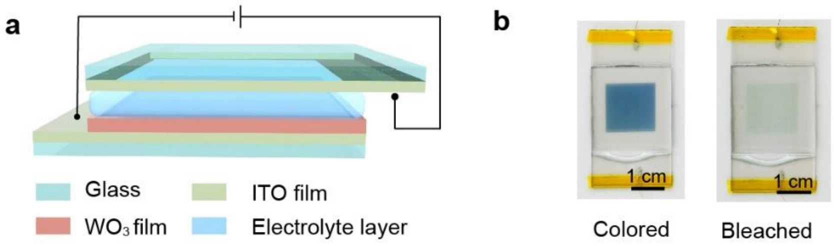

Fig. S8. (a) The structure of signal-pixel ECD with WO_3 film areas of 1.5×1.5 cm^2. (b) The photographs of the device in colored and bleached states, respectively.

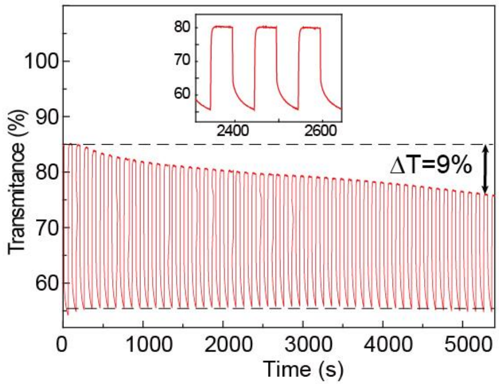

Fig. S9. The switching test between coloration and bleaching of as-fabricated ECD at the wavelength of 633 nm.

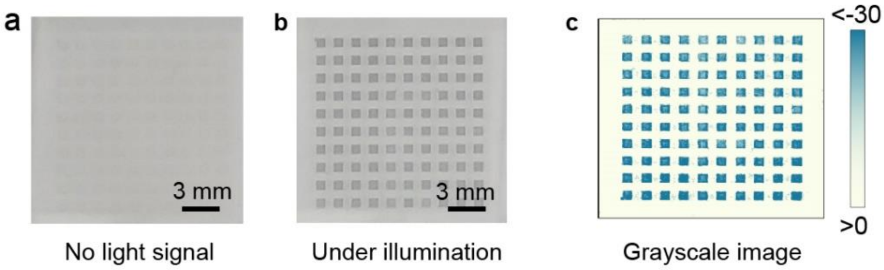

Fig. S10. (a-b) The recorded images of the system in dark and under illumination. (c) the corresponding grayscale image of all 100 pixels in the colored state.

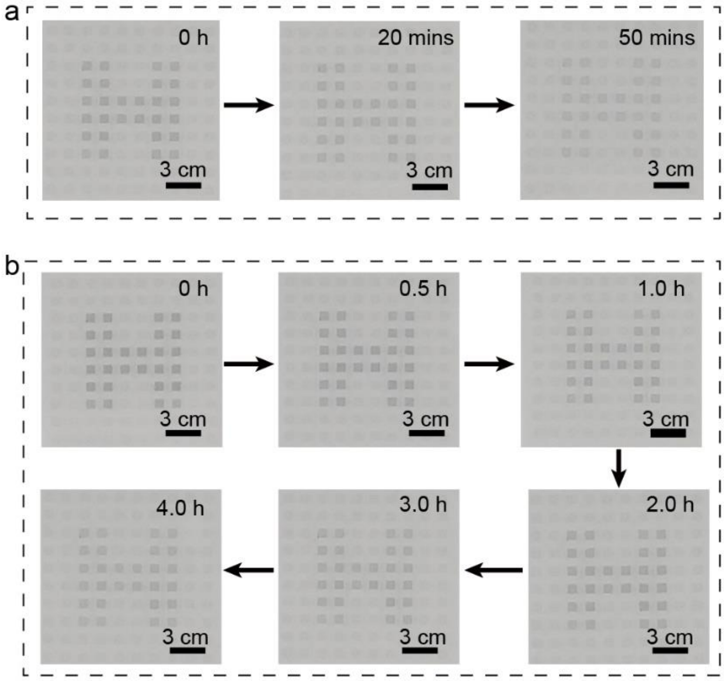

Fig. S11. When the illumination stimulation for 40 s (a) and 100s (b), respectively, the changes of recorded "H"-shaped pattern after removing both illumination stimulation and power supply.