Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Brain-Like Optoelectronic Artificial Synapse with Ultralow Energy Consumption Based on MXene Floating-Gate for Emotion Recognition

Yixin Cao, Chun Zhao, Tianshi Zhao, Yi Sun, Zhengjun Liu Xianyao Li, Li Yin, Jiangmin Gu, Hao Ren, Xianwei Geng, Jian Yao and Lixing Kang

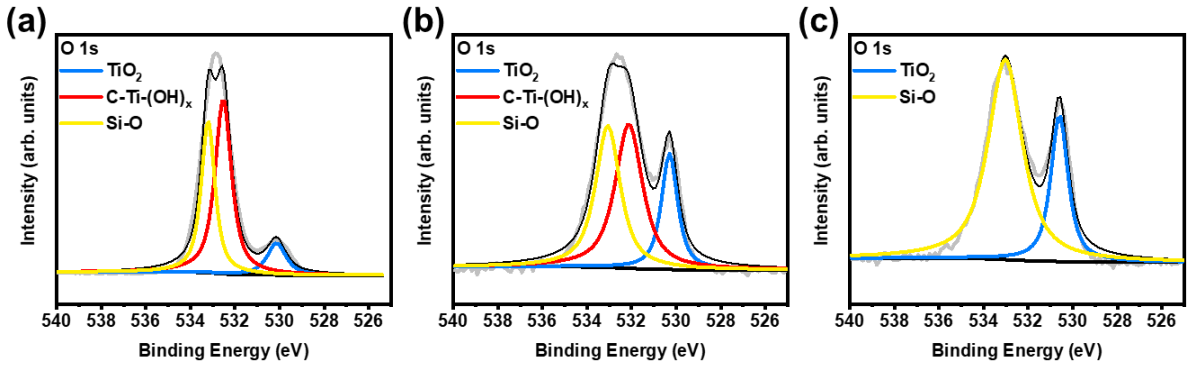

Figure S1. O 1s XPS spectra are scanned on the surfaces of (a) the unoxidized oxidized MXene, (b) MXene heated at 60°C for 20 min in air, and (c) MXene heated at 60°C for 3 h in air.

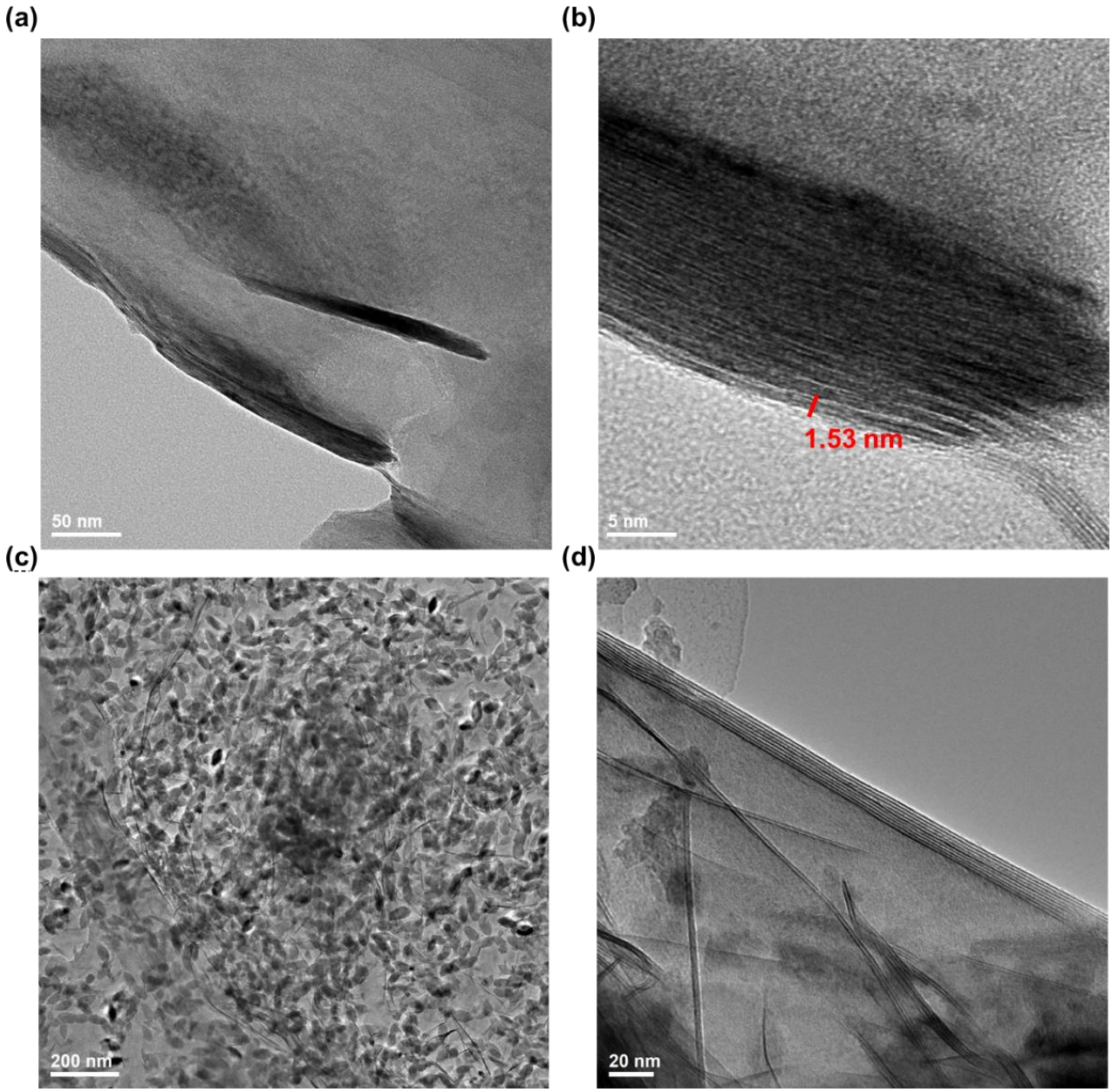

Figure S2. (a) HR-TEM results of the unoxidized MXene. (b) Enlarged view from Figure S2a. (c) HR-TEM results of the oxidized MXene. (d) HR-TEM micrographs show the edge of MXene is still a multilayer structure.

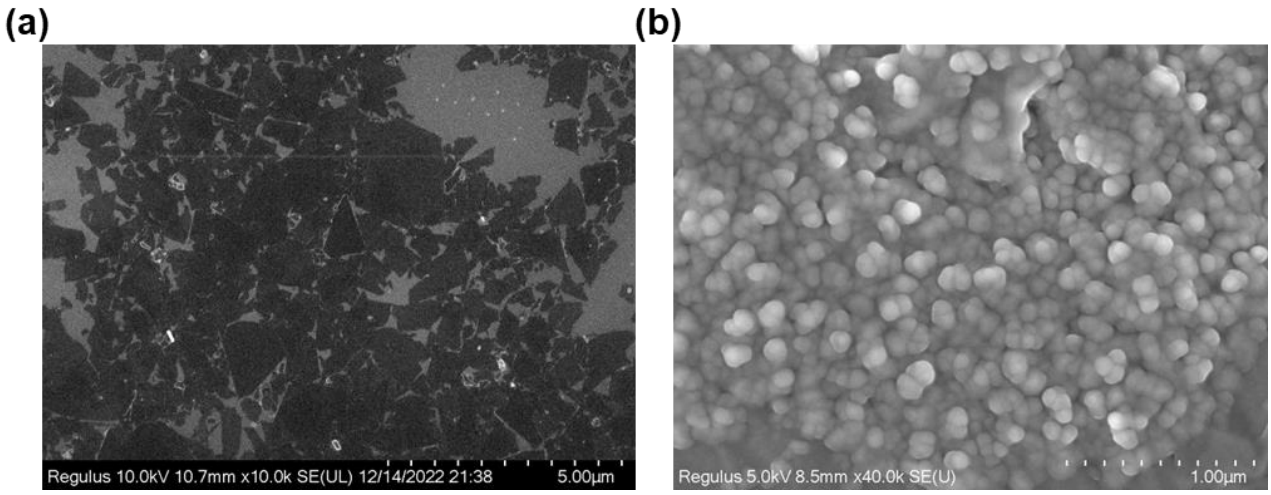

Figure S3. SEM micrographs for MXene (a) before and (b) after annealing.

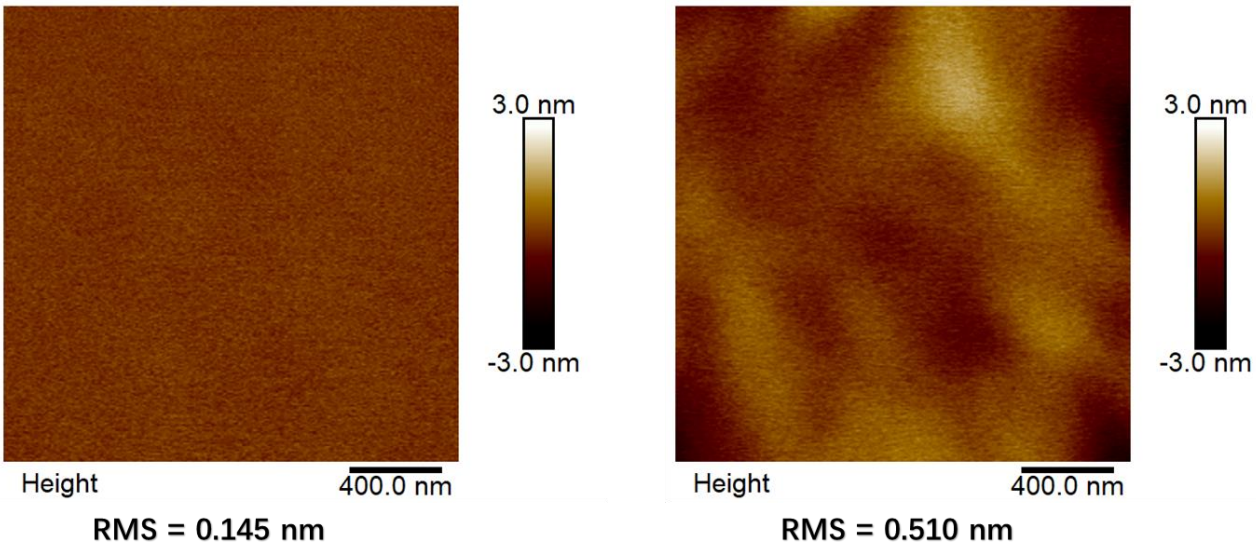

Figure S4. AFM images of artificial synapse with and without MXene.

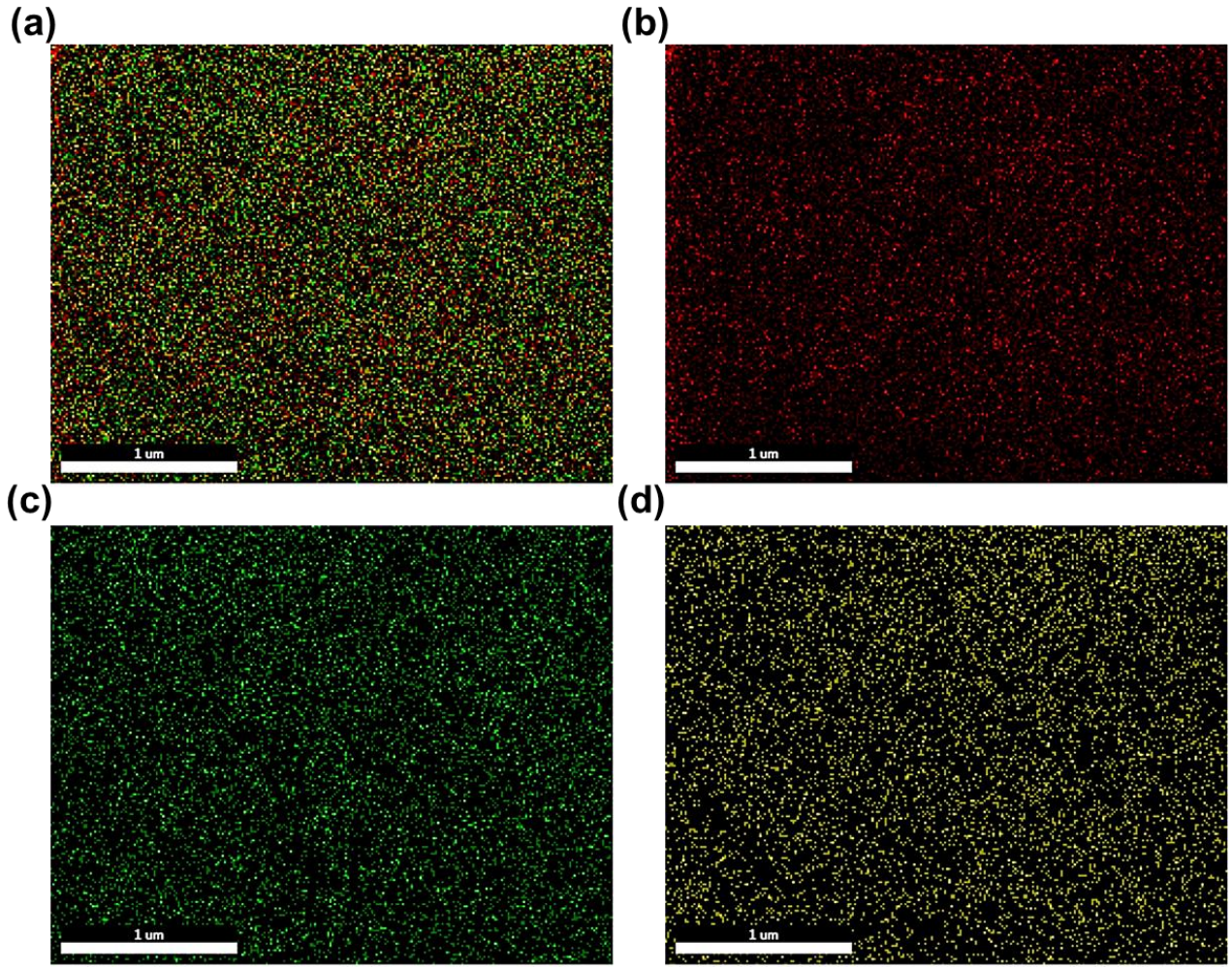

Figure S5. (a) EDS results of the oxidized MXene. EDS mapping of (b) C, (c) O, and (d) Ti elements in MXene.

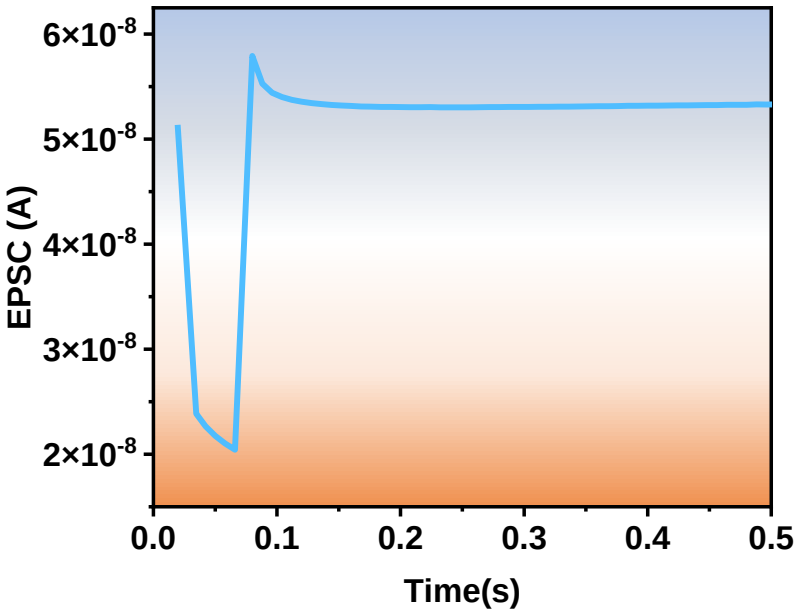

Figure S6. EPSC generate by a negative gate electrical pulse,

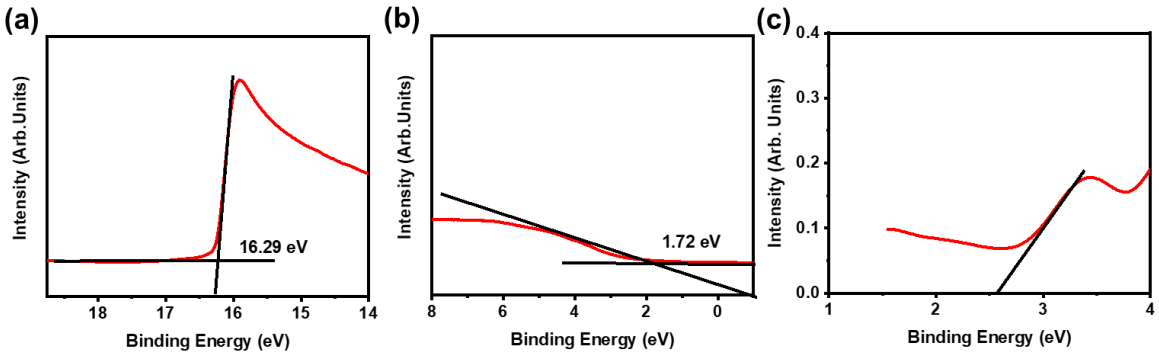

Figure S7. The UPS spectra of MXene oxidized in the air for 20 min with (a) E_{cutoff} and (b) E_{onset}. (c) The UV-Vis spectra of MXene oxidized in the air for 20 min.

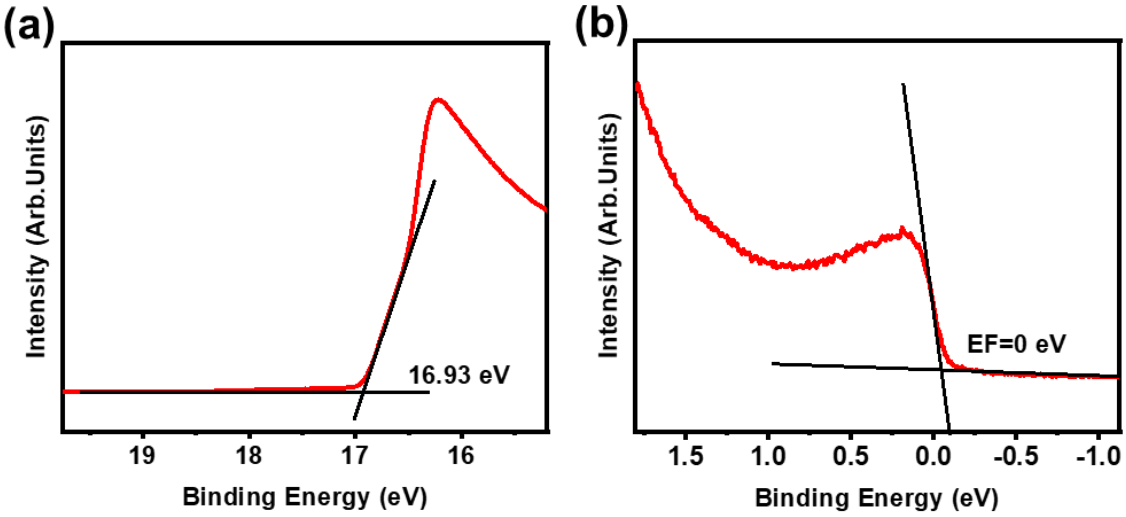

Figure S8. The UPS spectra of unoxidized MXene with (a) E_{cutoff} and (b) E_{onset}.

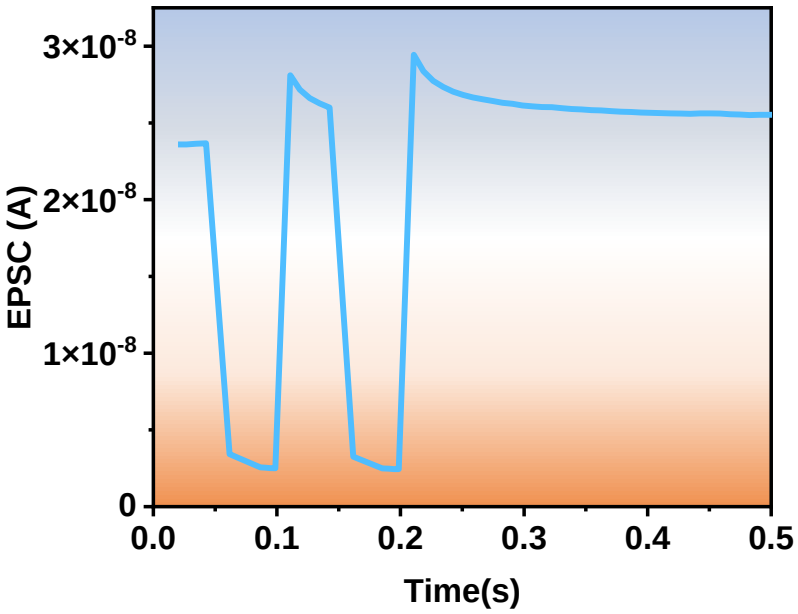

Figure S9. EPSC generate by a pair of negative gate electrical pulses.

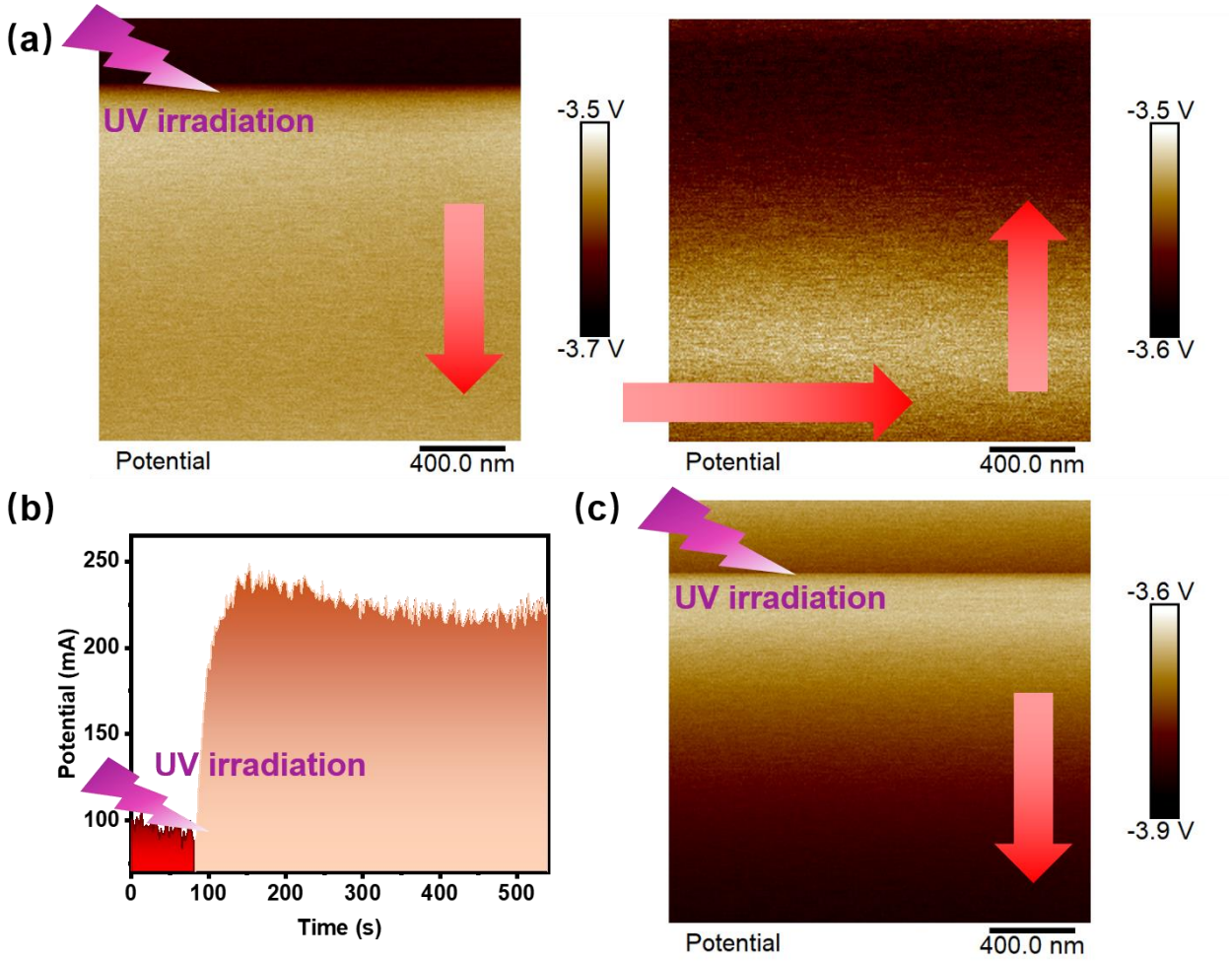

Figure S10. (a) Change in the surface potential of the MXene InO_x films with time. (b) Detailed in-plane ketches of the evolution of the CPD about the MXene InO_x layer. (c) The change in the surface potential of the InO_x films with time.