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

Supporting Information

Chemically Treated IGZO-based Highly Visible-Blind UV Phototransistor with Suppression of Persistent Photoconductivity Effect

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Figure S11. Photosensitivities of pristine IGZO and 2EEG-IGZO samples with varying vol% ratios (8:1:1, 8:1:2, 8:1:4, and 8:1:8) as a function of V_G, measured under red, green, blue, and UV light.

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Figure S18. Transfer characteristics of 2EEG-IGZO (8:1:1) under NBS condition with different UVO treatment duration of (a) 1 min, (b) 2 min, and (c) 3 min, and under NBIS condition with (d) 1 min, (e) 2 min, and (f) 3 min of UVO treatment durations, respectively. (V_G = -20V)

Figure S19. (a) Temporal photoresponse of 2EEG-IGZO (8:1:1 vol%) as a function of UVO treatment duration (0, 1, 2, 3 min) and (b)-(e) the corresponding rising/falling times of each sample. (V_G = -15V, V_D = 0.1 V)

Figure S20. A real outdoor experiment image to clarify the potential of optimized 2EEG-IGZO TFTs as a real UV sensor.

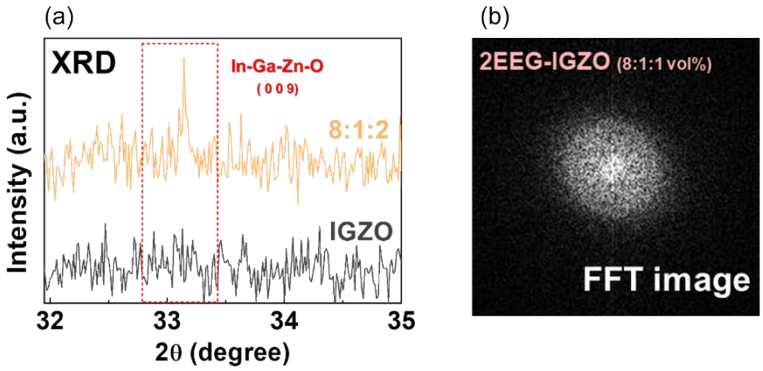


Figure S1. (a) XRD analysis of pristine IGZO and 2EEG-IGZO with a specific volume ratio of 8:1:2 and (b)FFT image of 2EEG-IGZO with 8:1:1 vol%.

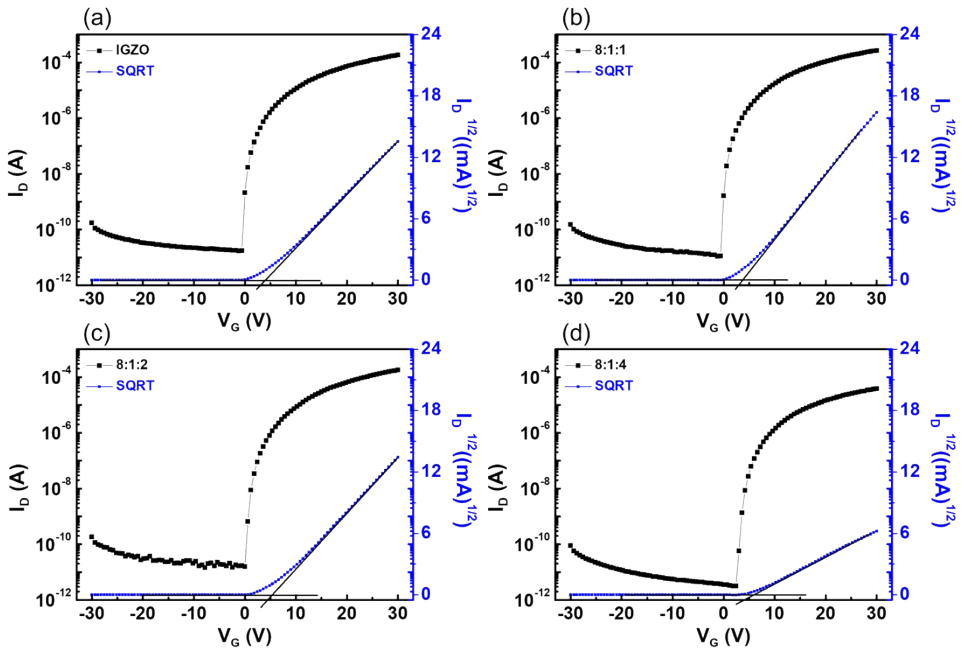


Figure S2. Transfer curves (left) and SQRT drain current (I_D) curves (right, blue) versus V_G for (a) IGZO, (b-d) 2EEG-IGZO with volume ratios of 8:1:1, 8:1:2, and 8:1:4 vol%, respectively.

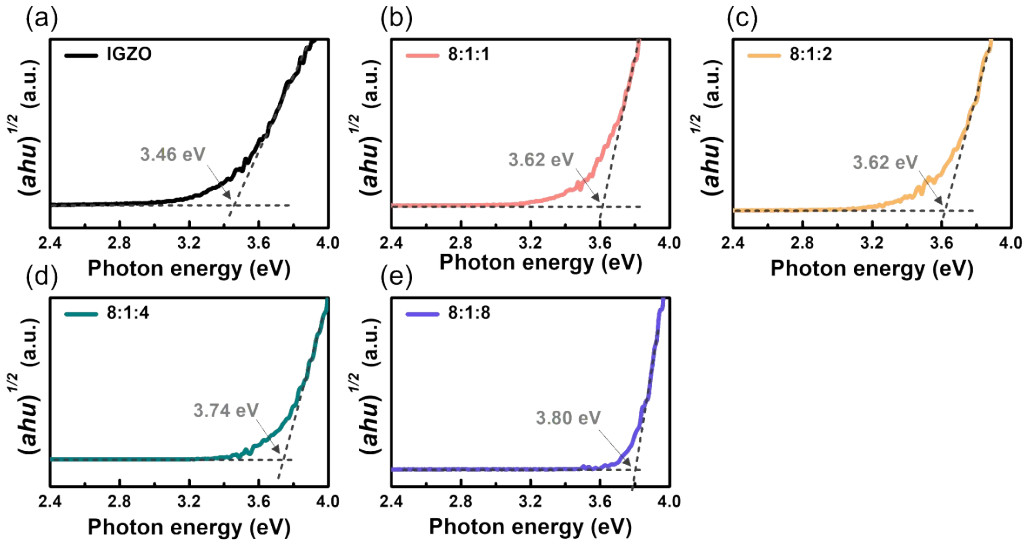


Figure S3. Optical bandgap energy of (a) IGZO, (b-e) 2EEG-IGZO samples with various volume ratio of 2-EE and EG (8:1:1, 8:1:2, 8:1:4, 8:1:8 vol%) calculated by Tauc plot method.

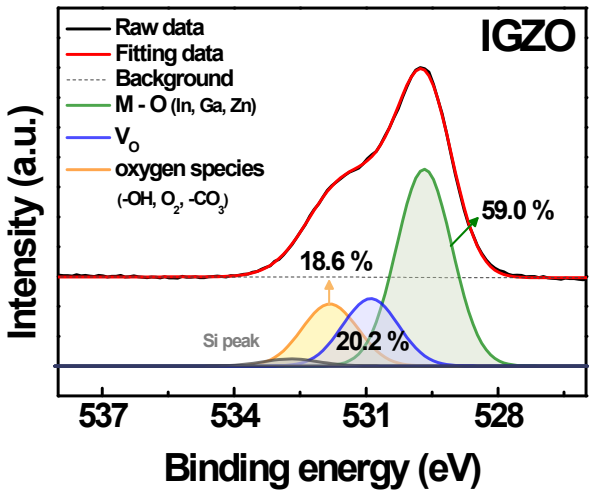


Figure S4. XPS O 1s spectra of bare IGZO sample.

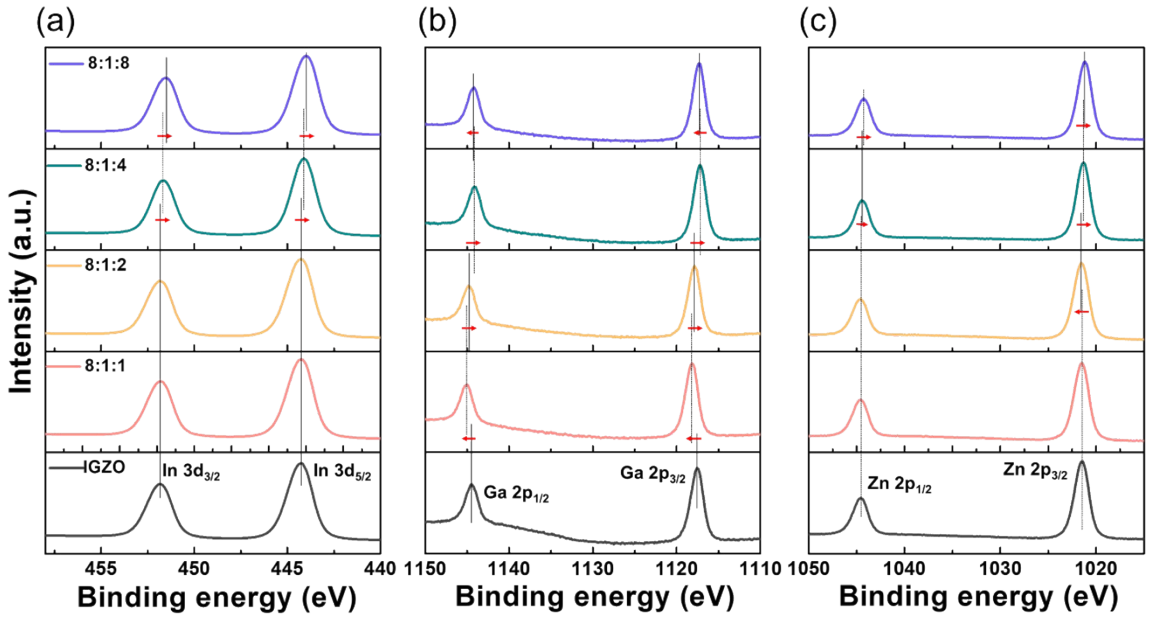


Figure S5. XPS spectra of (a) In 3d, (b) Ga 2p, (c) Zn 2p for IGZO, 2EEG-IGZO samples (8:1:1, 8:1:2, 8:1:4, 8:1:8 vol%).

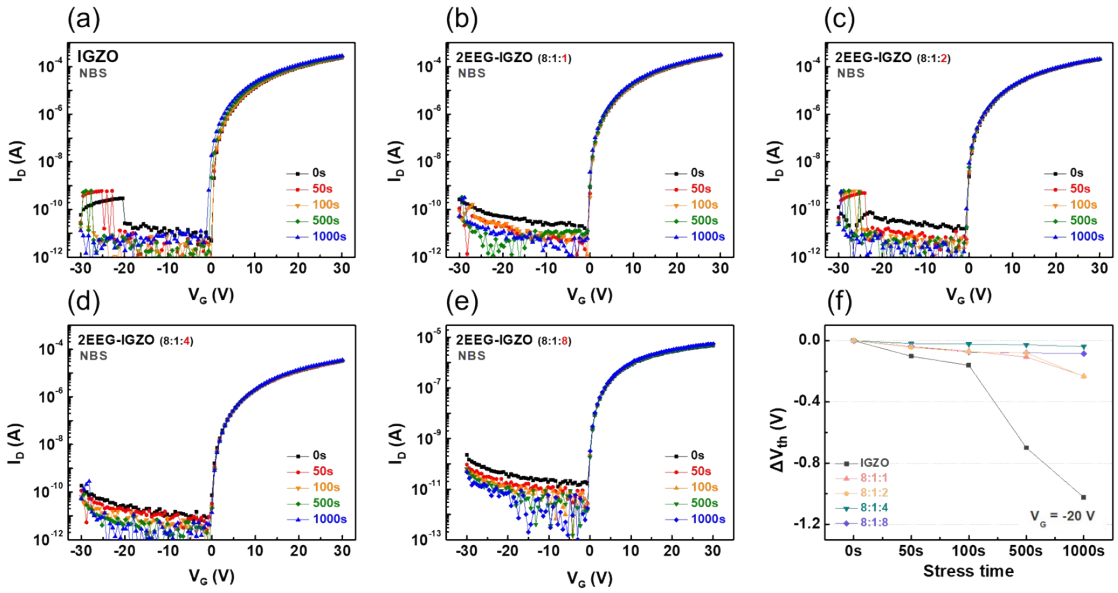


Figure S6. Transfer characteristics under NBS (V_G = -20 V) of (a) pristine IGZO and 2EEG-IGZOs with different volume ratios of (b) 8:1:1, (c) 8:1:2, (d) 8:1:4, and (e) 8:1:8, respectively. (f) V_{th} shift with varying stress time under NBS condition.

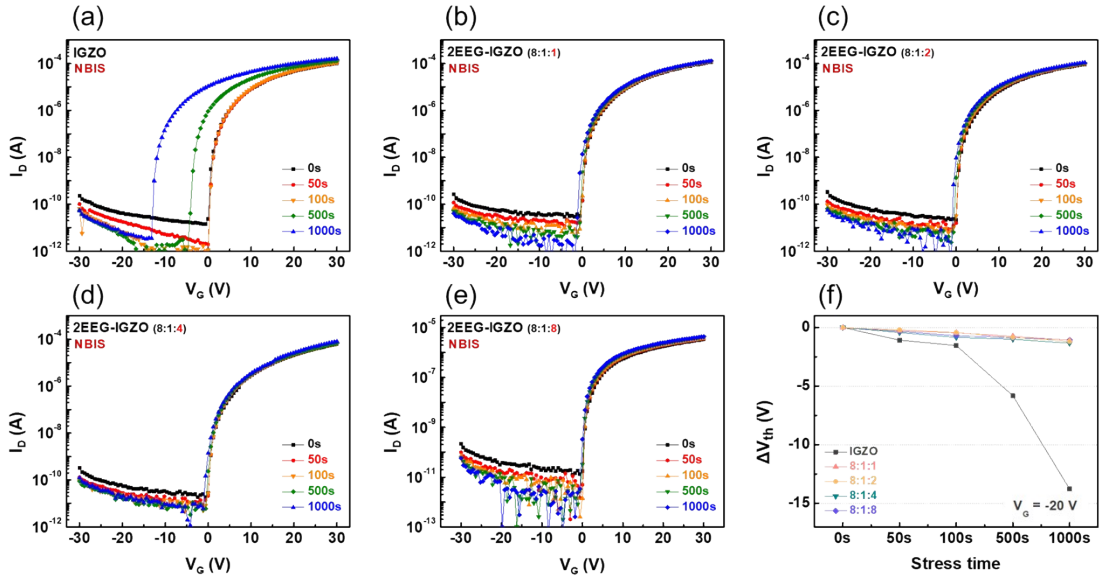


Figure S7. Transfer curves under NBIS (V_G = -20 V) of (a) pristine IGZO and 2EEG-IGZOs with different volume ratios of (b) 8:1:1, (c) 8:1:2, (d) 8:1:4, and (e) 8:1:8, respectively. (f) V_{th} shift with various stress time under NBIS condition.

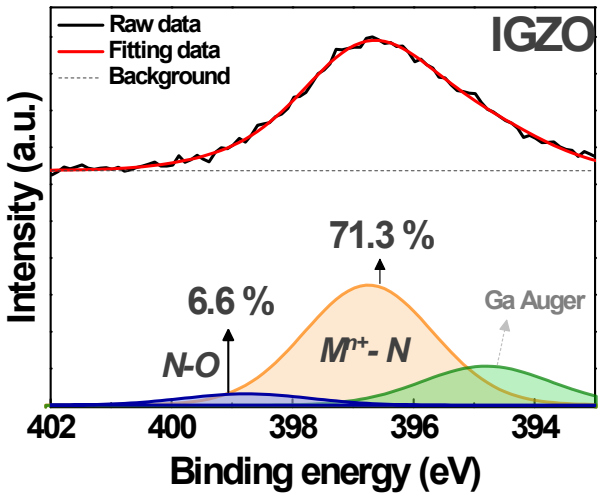


Figure S8. XPS N 1s spectra of bare IGZO sample.

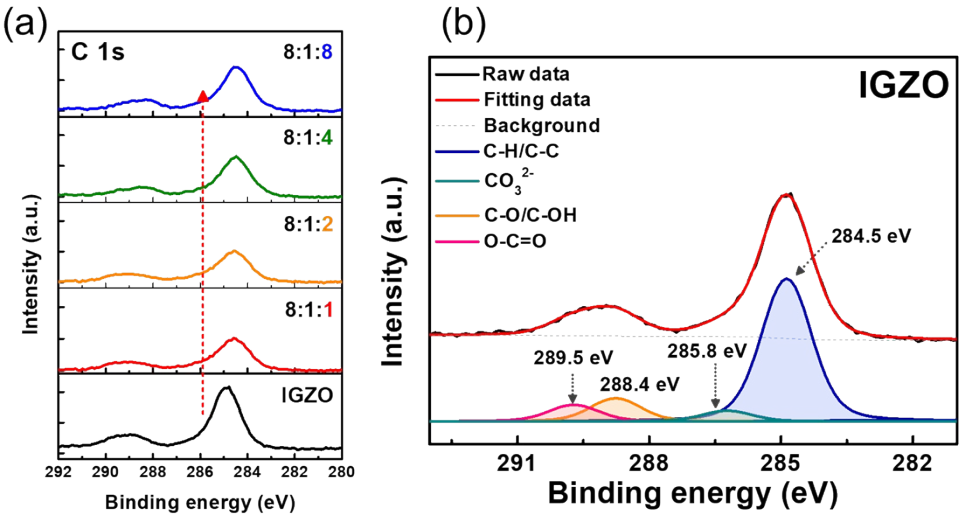


Figure S9. XPS C 1s spectra of (a) IGZO, 2EEG-IGZO samples with volume ratios of 8:1:1, 8:1:2, 8:1:4, 8:1:8 vol%, and (b) the four deconvoluted C 1s peak of IGZO.

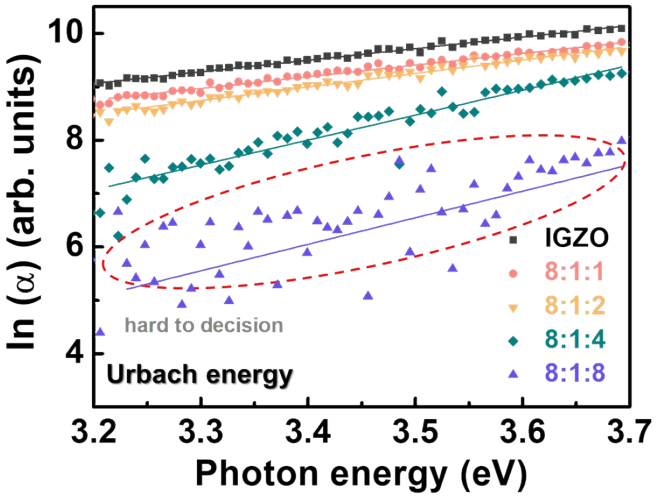
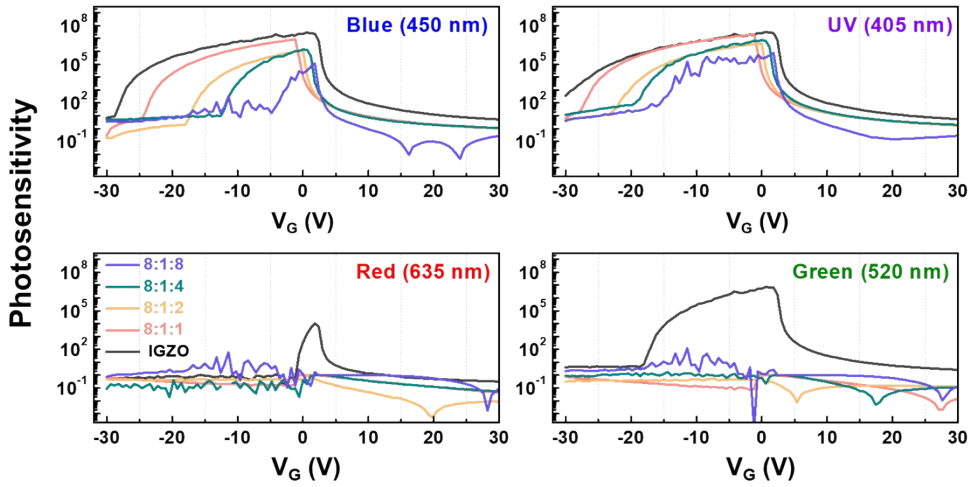


Figure S10. Urbach energy plots of the IGZO, 2EEG-IGZO samples with different additive volume ratio of 8:1:1, 8:1:2, 8:1:4, and 8:1:8 vol%, respectively.



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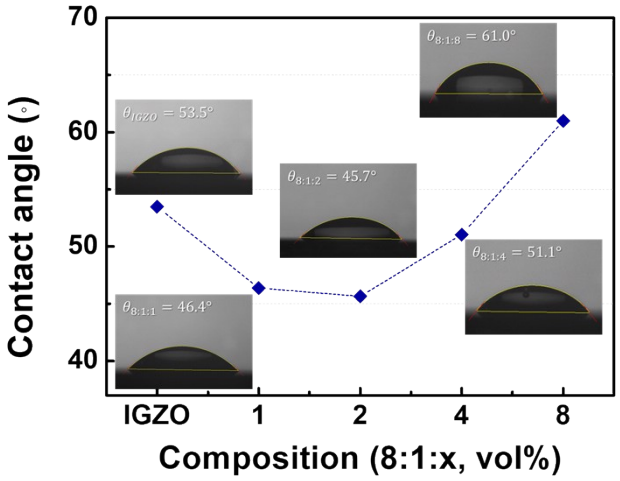

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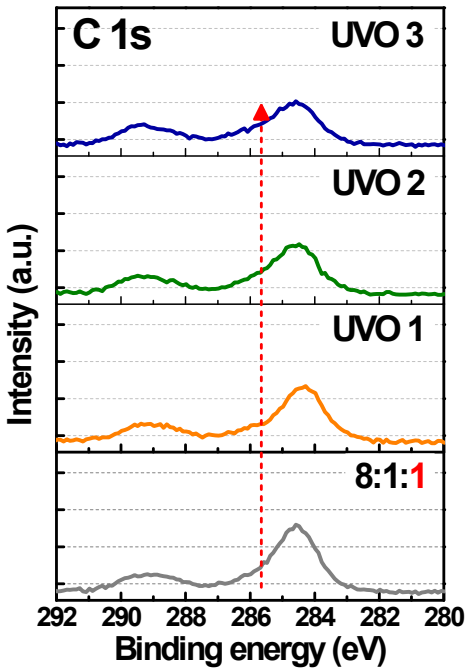

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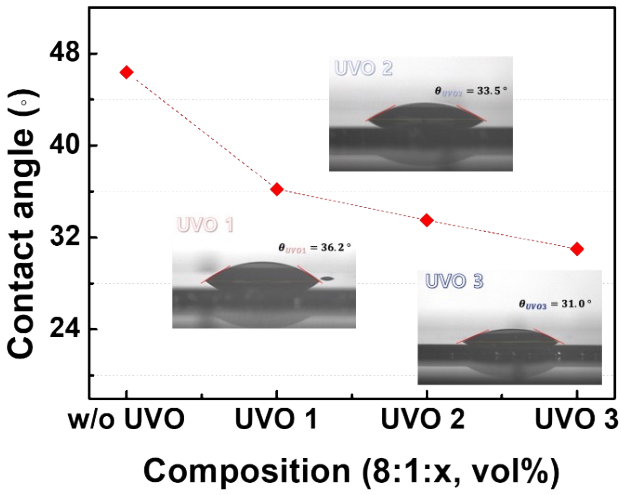

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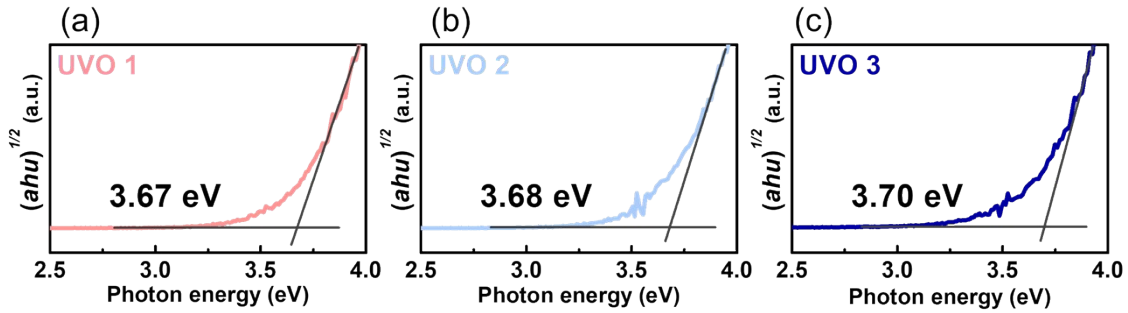

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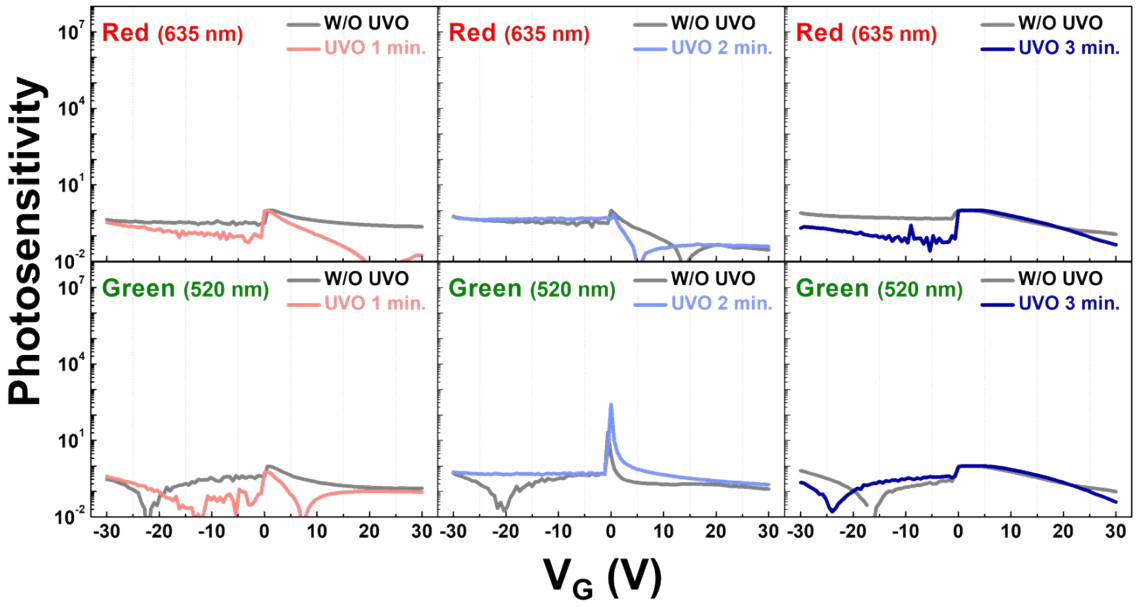

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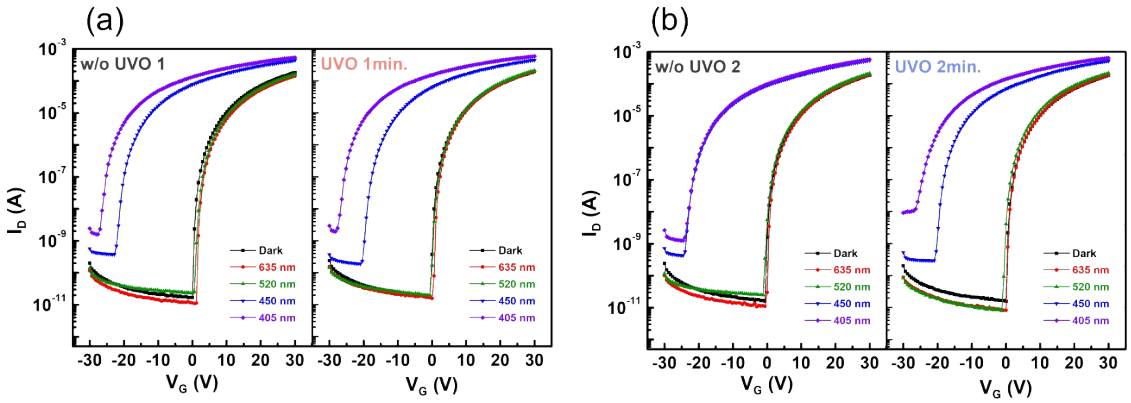

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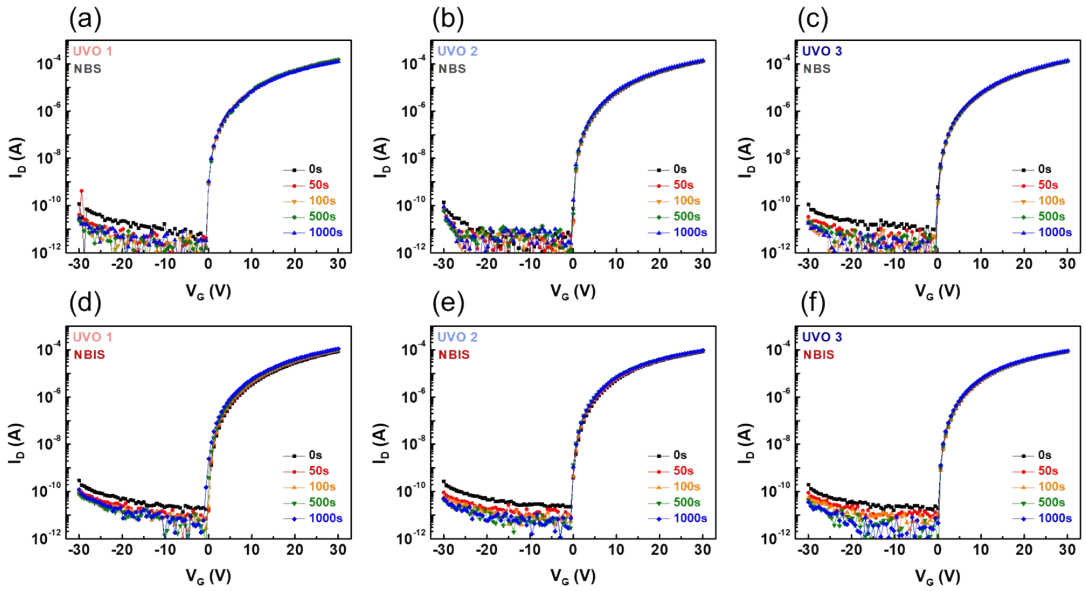

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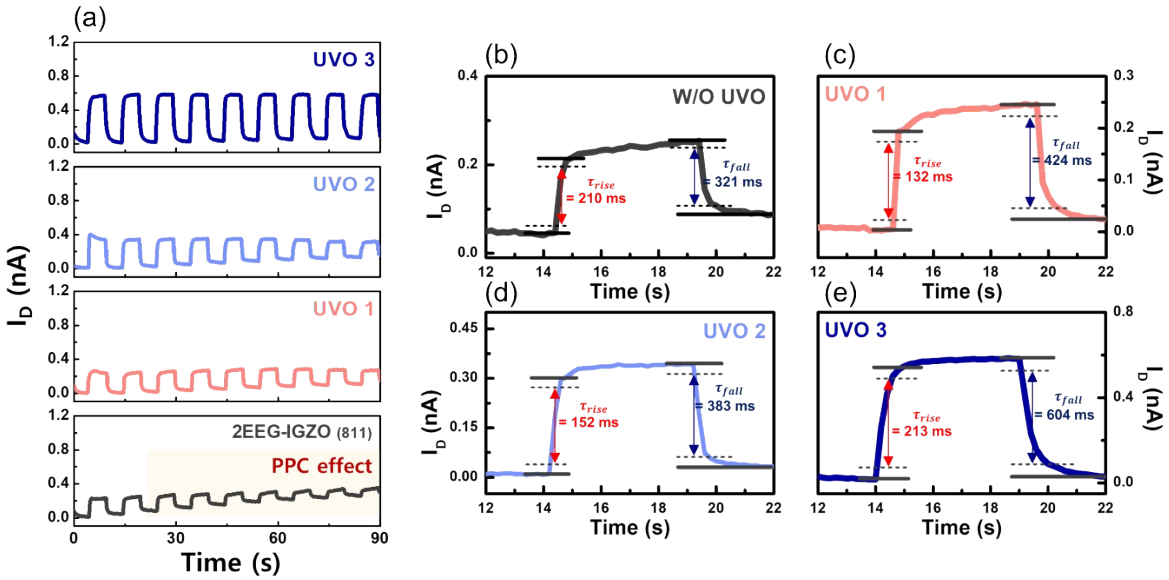

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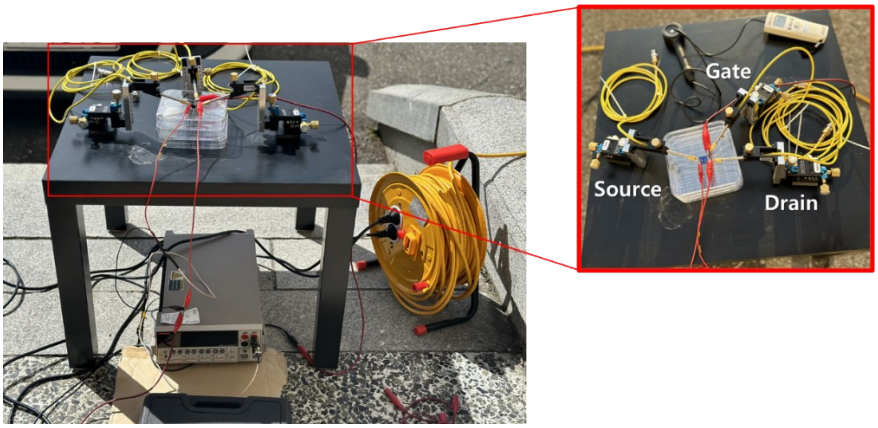

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