

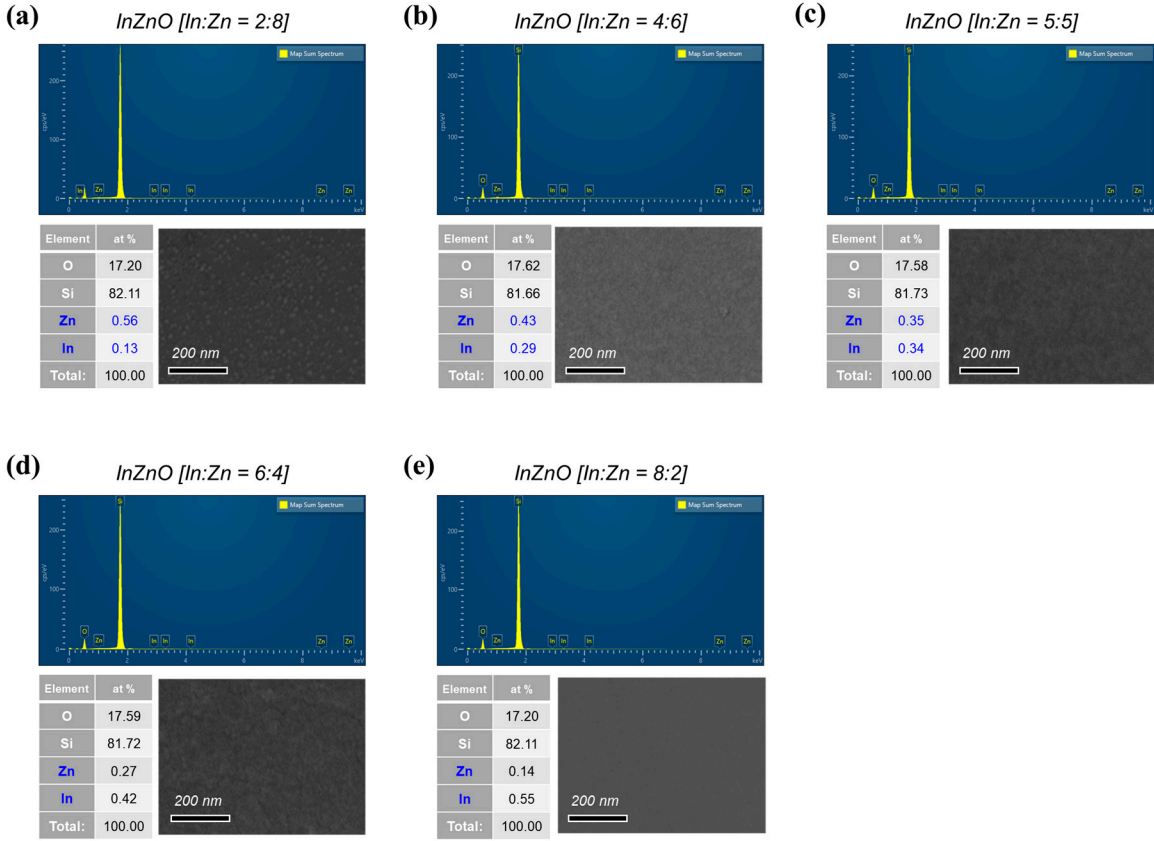
## **Supporting Information**

# **Composition Engineering of Indium Zinc Oxide Semiconductors for Damage-Free Back-Channel Wet Etching Metallization of Oxide Thin-Film Transistors**

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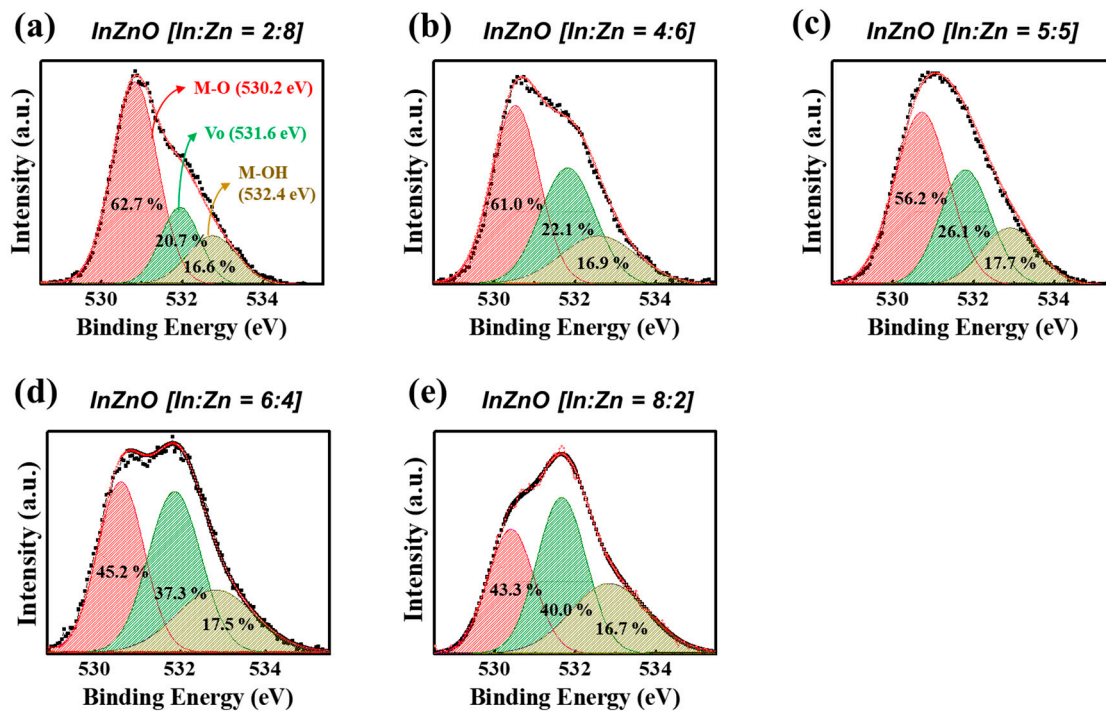
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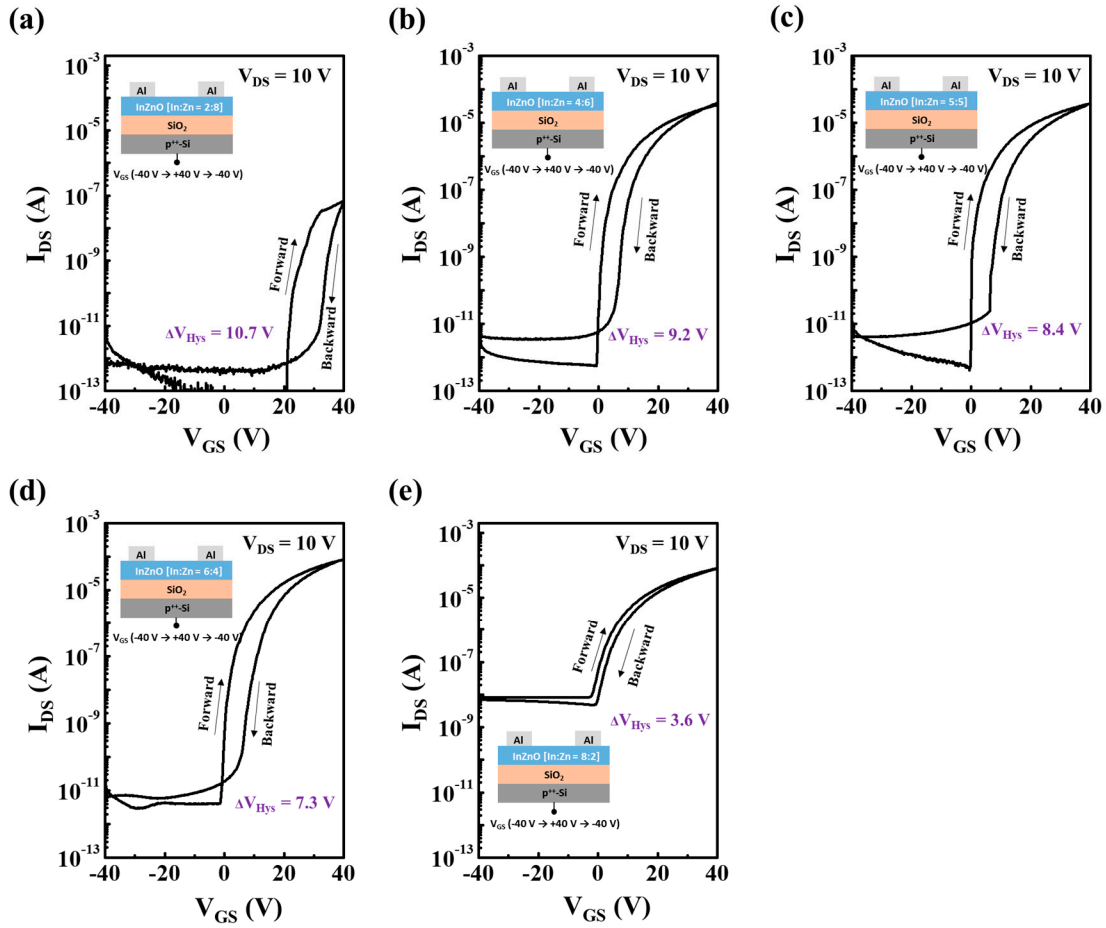


**Figure S1.** Composition data and surface images (top view) of cation-composition controlled InZnO semiconductor thin films evaluated by EDS and SEM. The composition ratio of In and Zn (In:Zn) are (a) 2:8, (b) 4:6, (c) 5:5, (d) 6:4, and (e) 8:2.

*XPS spectra of O 1s peak*

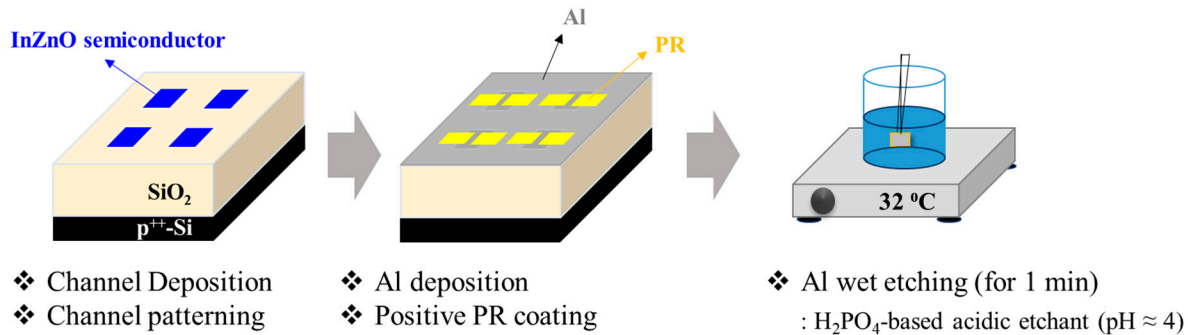


**Figure S2.** XPS O 1s peaks and deconvoluted fitting curves of cation composition controlled InZnO semiconductor thin films. The composition ratio of In and Zn (In:Zn) are (a) 2:8, (b) 4:6, (c) 5:5, (d) 6:4, and (e) 8:2.

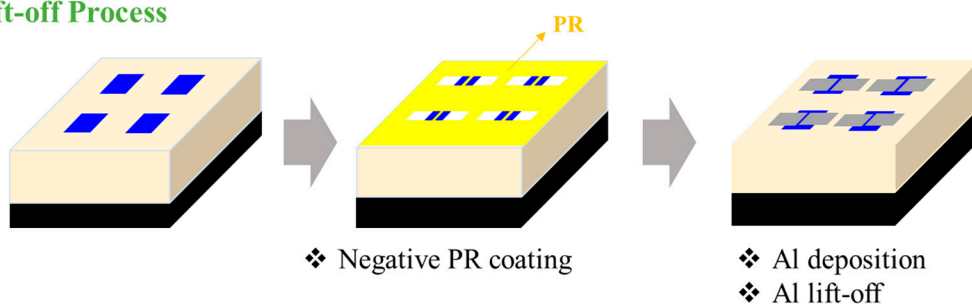


**Figure S3.** Hysteresis properties of InZnO TFTs using cation-composition controlled InZnO semiconductors. The composition ratio of In and Zn (In:Zn) are (a) 2:8, (b) 4:6, (c) 5:5, (d) 6:4, and (e) 8:2.

### Al wet etching Process

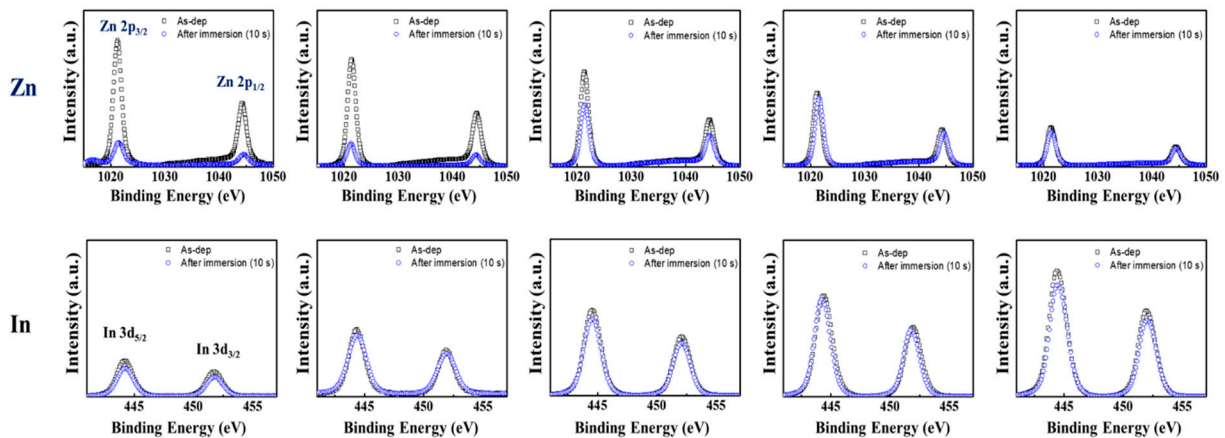


### Al lift-off Process



**Figure S4.** Wet-etching using the  $\text{H}_2\text{PO}_4$ -based acidic etchant and lift-off processes of Al source/drain (S/D) electrodes for solution-processed InZnO TFTs.

XPS spectra for Zn 2p<sub>1/2</sub>, 2p<sub>3/2</sub> and In 3d<sub>3/2</sub>, 3d<sub>5/2</sub>



**Figure S5.** Zn 2p and In 3d XPS peaks obtained from composition-controlled InZnO films before and after immersion in H<sub>2</sub>PO<sub>4</sub>-based acidic Al wet-etchant for 10 seconds.