Supporting Information

Stretchable Polymer Gate Dielectric by Ultraviolet-Assisted Hafnium Oxide Doping at Low Temperature for High-Performance Indium Gallium Tin Oxide Transistors

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1. FTIR spectra of the PVP-*co*-PMMA-based dielectric films.

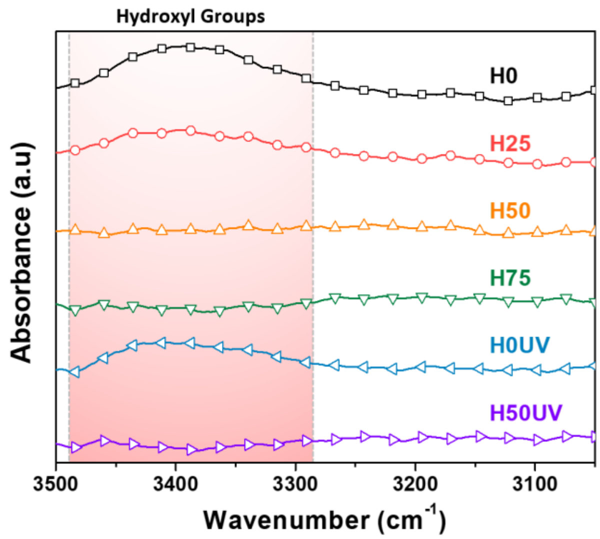


Figure S1. FTIR spectra of the PVP-*co*-PMMA-based dielectric films with different inorganic volumetric ratios and UV treatment.

2. Insulating and dielectric characteristics of the HfO_x dielectric film.

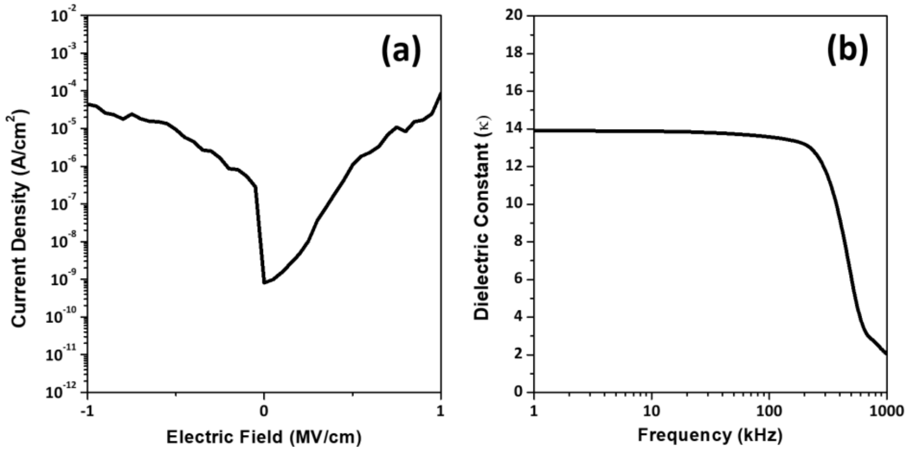


Figure S2. (a) Gate leakage current density (J_g) versus applied electric field (E) and (b) dielectric constant versus frequency characteristics of the capacitor with HfO_x dielectric film. Because the annealing was performed at a low temperature of 150 °C, this capacitor suffered from huge leakage current density.

3. Transfer characteristics of the IGTO TFTs with a plot of V_{GS} versus $I_{DS}^{1/2}$.

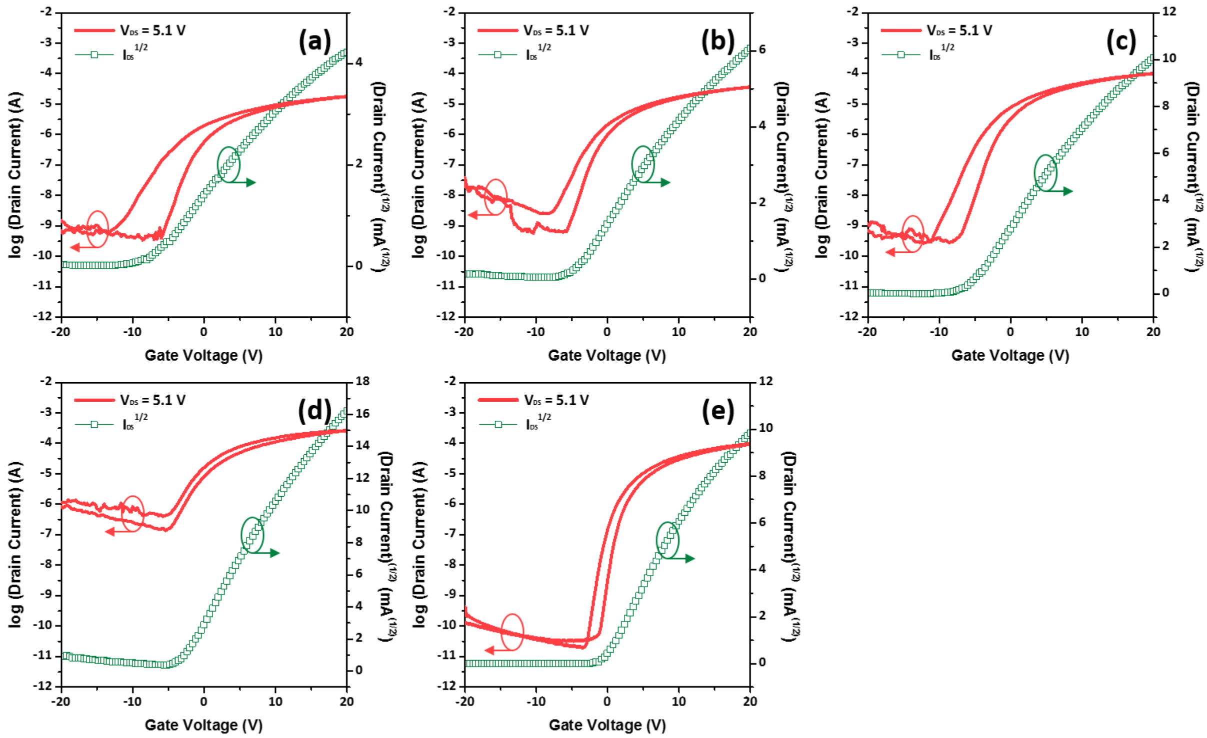
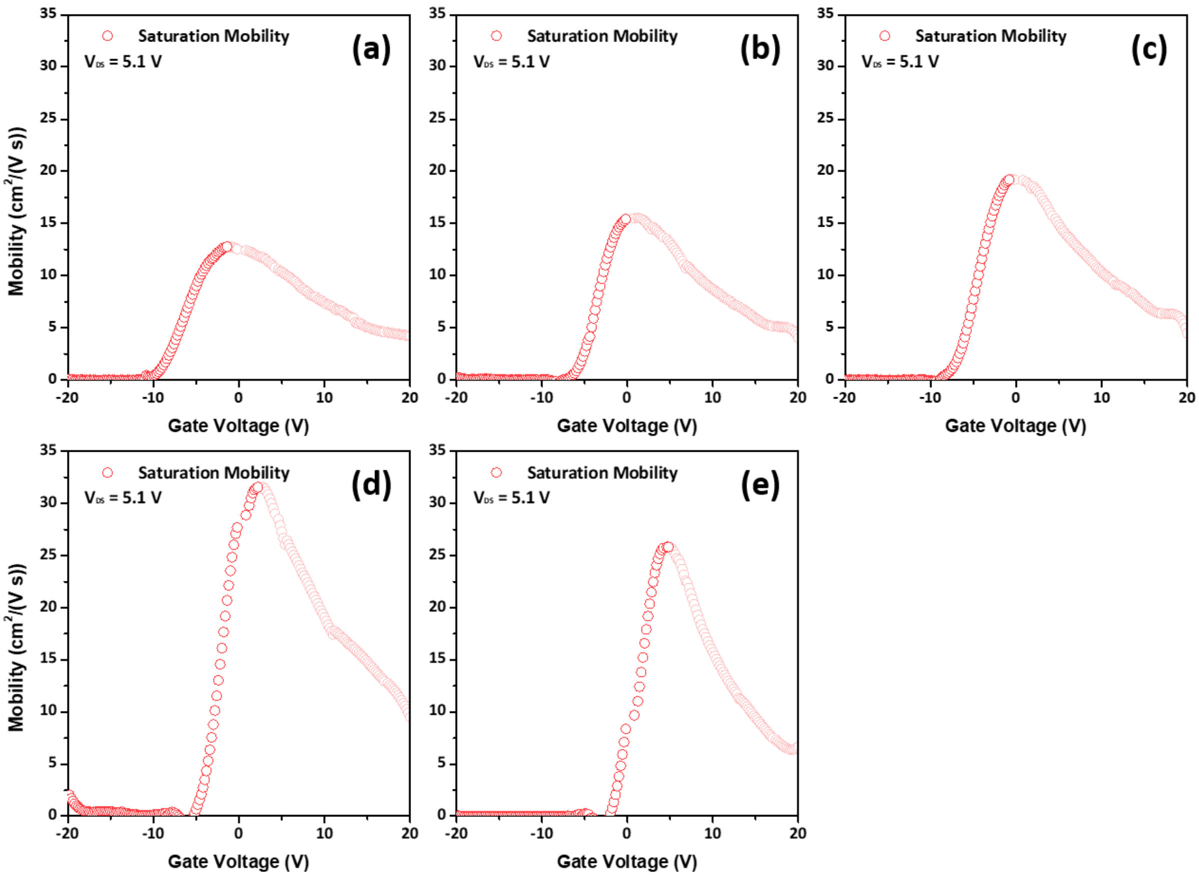


Figure S3. Transfer characteristics of the IGTO TFTs with PVP-*co*-PMMA-based gate insulators of (a) H0, (b) H25, (c) H50, (d) H75, and (e) H50UV when V_{DS} is 5.1 V. Also the plot of V_{GS} versus $I_{DS}^{1/2}$ value was shown in each transfer curve.

4. Mobility extraction of the IGTO TFTs.



Figures S4. Saturation mobility calculation from the measured drain current values (V_{DS} = 5.1 V, forward direction) of the IGTO TFTs with PVP-*co*-PMMA-based gate insulators of (a) H0, (b) H25, (c) H50, (d) H75, and (e) H50UV. Deep red symbols indicate the mobility values at the saturation region.

5. Fabrication process of PDMS film and Al_2O_3 dielectric film.

The polydimethylsiloxane (PDMS) films were prepared using sylgard 184 silicone elastomer kit (Dow Corning Co.) by mixing base and curing agent at volume ratio of 10: 1. The mixture was vigorously stirred for 10 min and then placed in a vacuum desiccator for 3 h until the bubbles were completely removed. Then, the mixture was spin-cast onto the glass substrates at 500 rpm for 30 s, followed by pre-baking on a hot plate for 10 min at 150 °C for thermal curing. The thickness of the PDMS films were approximately 200 μm. Before the dielectric film deposition on the PDMS films, UV light was shined onto the PDMS films for 1 h to modify the surface properties from hydrophobic to hydrophilic to achieve the improved adhesion between the PDMS film and dielectric film.

The Al_2O_3 dielectric films were prepared by traveling wave type thermal ALD (CN1 Co., Ltd.) from using trimethylaluminium (TMA) as precursor. Ozone (O_3) and nitrogen (N_2) gases were employed as an oxidant and carrier gas, respectively. The substrate temperature was kept at 150 °C to satisfy the maximum process temperature of our work. No additional annealing process was done after deposition by the ALD system.