Supporting Information

All-sputtered oxide thin-film transistors fabricated at 150°C using a simultaneous ultraviolet and thermal treatment

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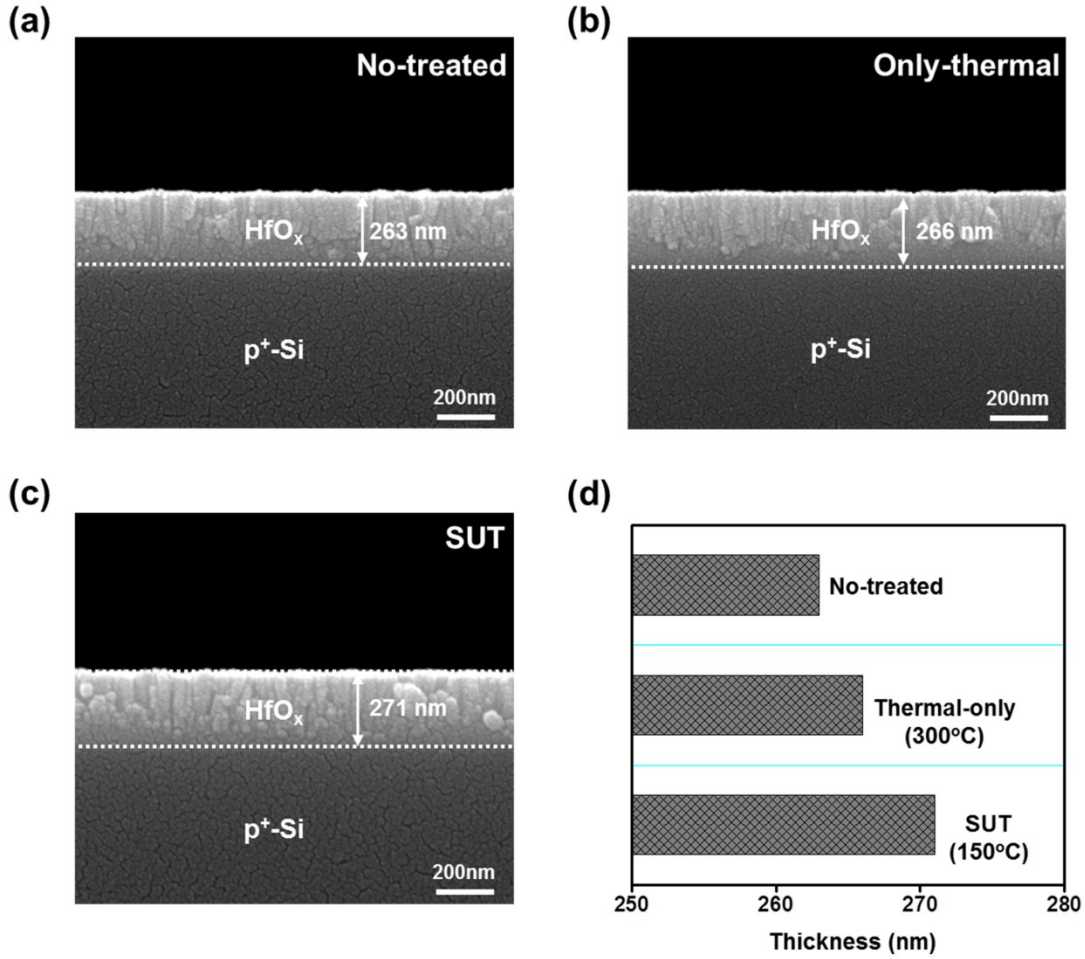

Figure S1. SEM images of the (a) non-, (b) thermal-only, and (C) SUT-treated HfOx films deposited over 40 min. (d) summarized thickness of all HfO_x films

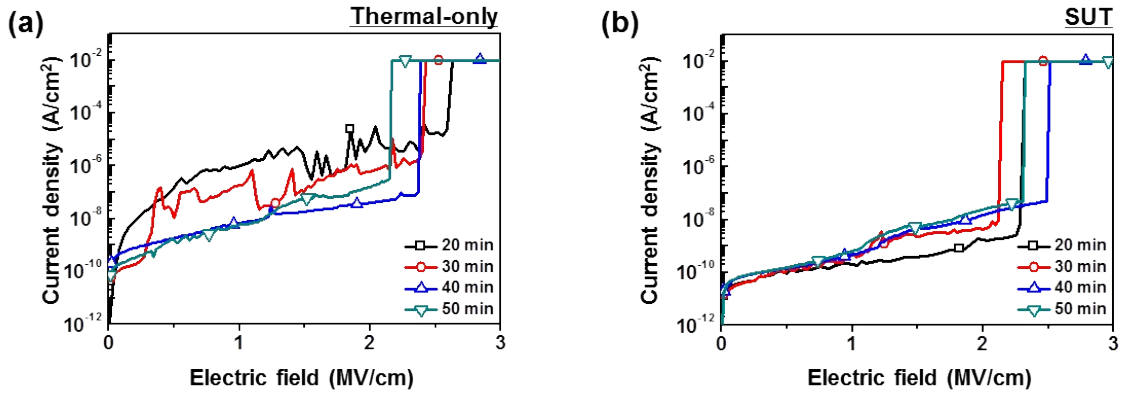

Figure S2. Leakage current density versus the electric field of (a) thermal-only treated HfO_x films with deposition times (300°C) (b) SUT treated HfO_x films with deposition times (150°C)

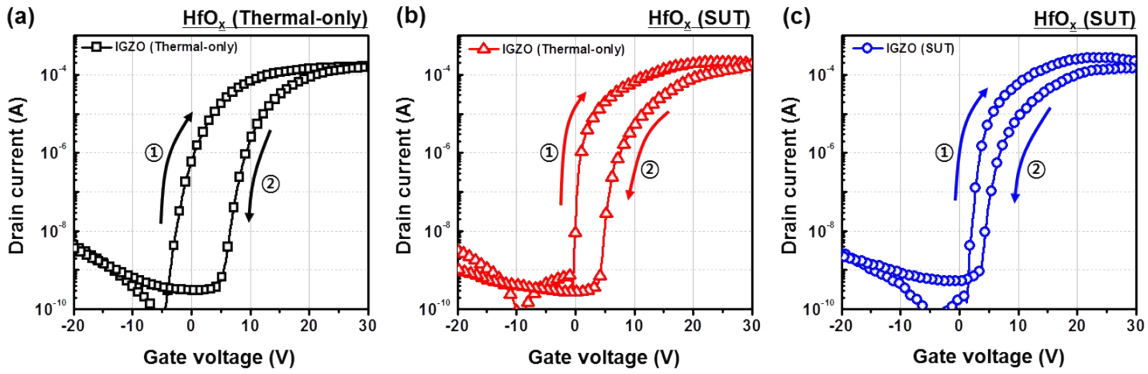

Figure S3. Hysteresis of thermal-only (both HfO_x and IGZO), SUT (HfO_x) and thermal-only (IGZO), and SUT (both HfO_x and IGZO) treated IGZO TFTs

Hysteresis width are defined as the voltage difference at $I_{DS} = 10^{-8}$ A. As a result, hysteresis widths of thermal-only (HfO_x and IGZO), SUT (HfO_x) and thermal-only (IGZO), and SUT (HfO_x and IGZO) treated IGZO TFTs are 9.1, 4.9, 2.1 V, respectively.

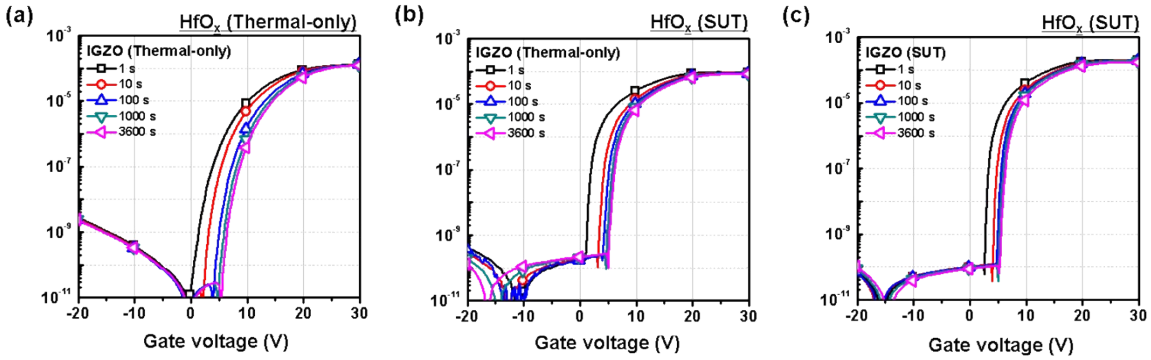

Figure S4. V_{th} shift under PBS test of thermal-only (both HfO_x and IGZO), SUT (HfO_x) and thermal-only (IGZO), and SUT (both HfO_x and IGZO) treated IGZO TFTs

In results of the PBS test, negative V_{th} shifts of thermal-only (both HfO_x and IGZO), SUT (HfO_x) and thermal-only (IGZO), and SUT (both HfO_x and IGZO) treated IGZO TFTs are 5.21, 3.89, 2.72 V, respectively.

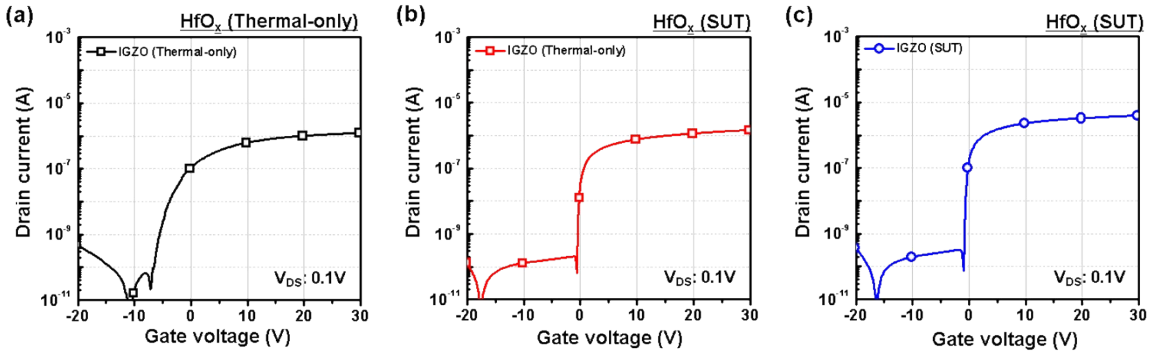

Figure S5. Transfer characteristics of thermal-only (both HfO_x and IGZO), SUT (HfO_x) and thermal-only (IGZO), and SUT (both HfO_x and IGZO) treated IGZO TFTs at V_{DS} of 0.1 V