

Electronic Supplementary Information (ESI)

Electrolyte-Gated Amorphous IGZO Transistors with Extended Gates for Prostate-Specific Antigen Detection

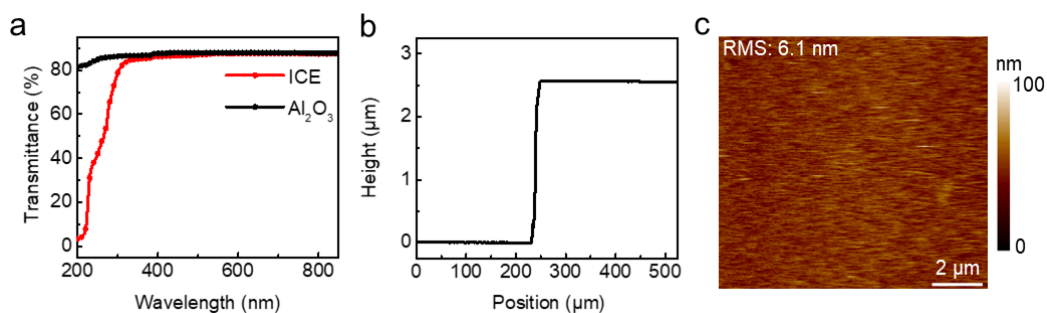


Fig. S1 (a) UV-visible transmittance of the ICE film. (b) Stylus profiler measurement of the ICE film. (c) AFM image of IGZO on the ICE film.

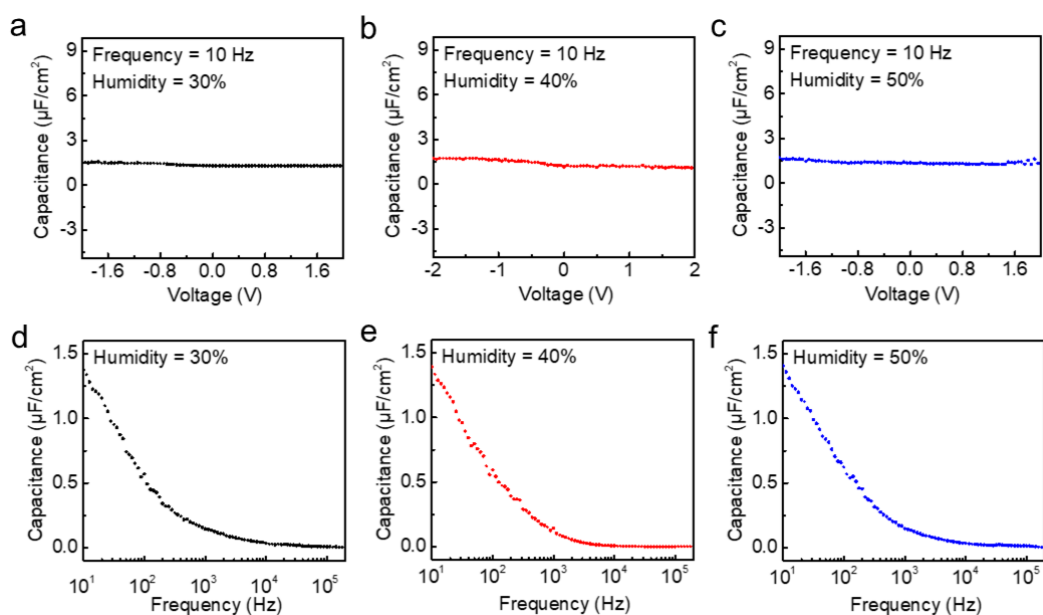


Fig. S2 Capacitance-voltage characteristics of the EDL capacitor at humidity levels of (a) 30%, (b) 40%, and (c) 50%. Capacitance-frequency characteristics at humidity levels of (d) 30%, (e) 40%, and (f) 50%.

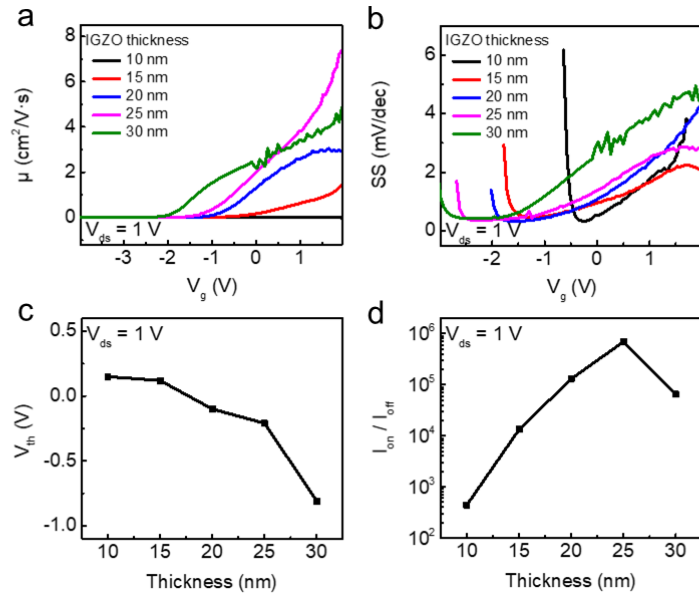


Fig. S3 Transistor characteristics of different IGZO thicknesses. Plots demonstrating the (a) mobility (μ) and (b) subthreshold swing (SS) as a function of gate voltage (V_g). The thickness of IGZO as a function of (c) threshold voltage (V_{th}) and (d) switching ratio (I_{on}/I_{off}).

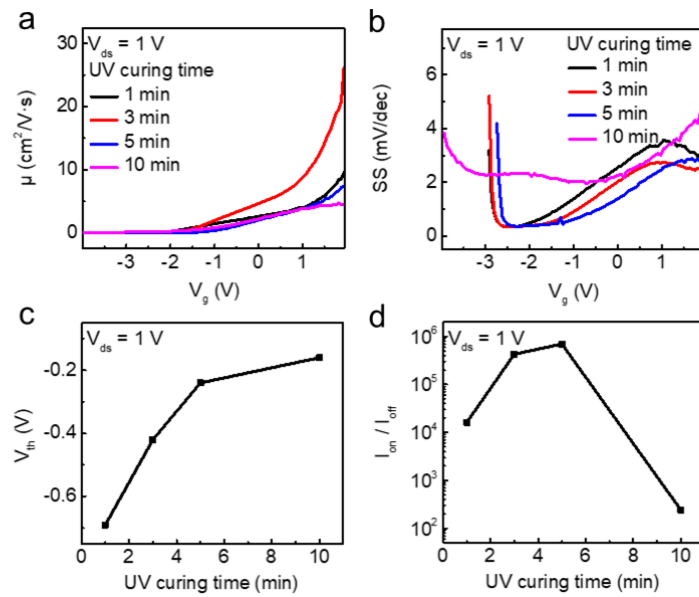


Fig. S4 Transistor characteristics with different UV curing time. Plots demonstrating the (a) μ and (b) SS as a function of V_g . UV curing time as a function of (c) V_{th} and (d) I_{on}/I_{off} .

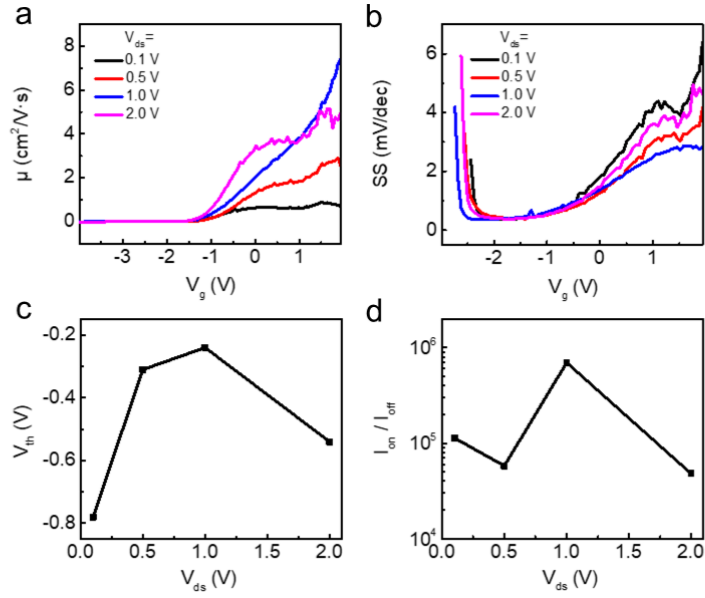


Fig. S5 Characteristics of IGZO transistors with different values of V_{ds} . Plots demonstrating the (a) μ and (b) SS as a function of V_g , V_{ds} as a function of (c) V_{th} and (d) I_{on}/I_{off} .

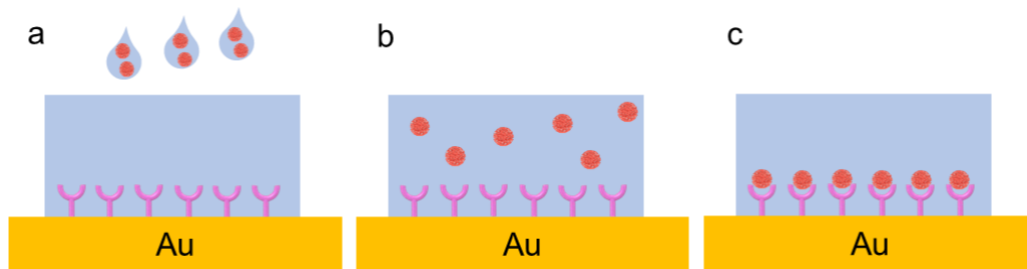


Fig. S6 (a) Addition of PSA to the anti-PSA functionalized sensing pad. (b) Diffusion of PSA through the buffer solution. (c) Antigen-antibody specific binding between PSA and anti-PSA.

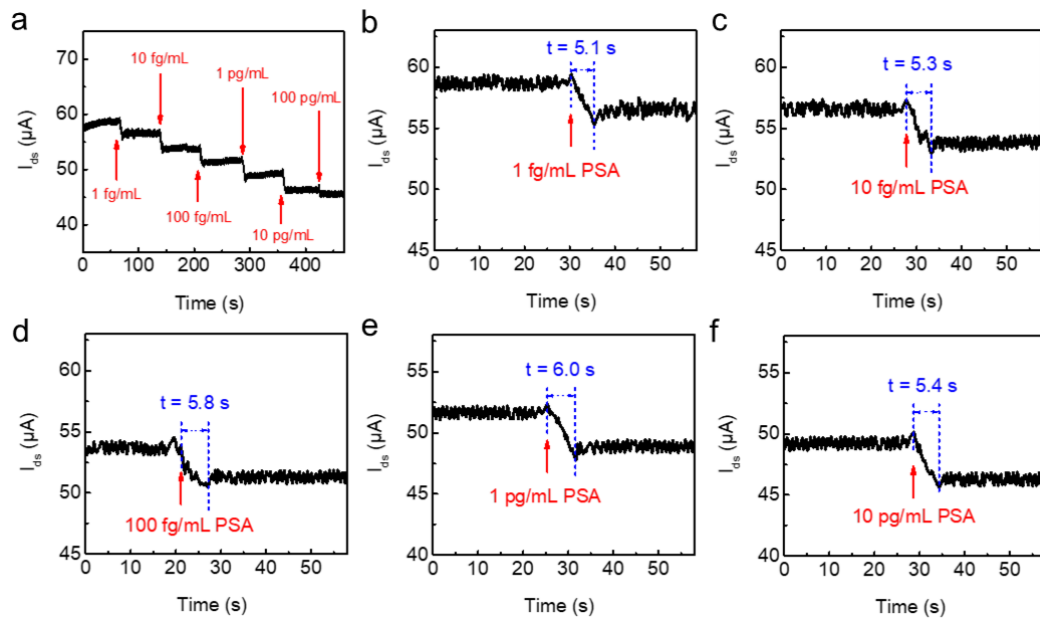


Fig. S7 (a) Real-time detection of the PSA molecules at different concentrations. Current responses before and after the addition of PSA with concentrations of (b) 1 fg/mL, (c) 10 fg/mL, (d) 100 fg/mL, (e) 1 pg/mL, and (f) 10 pg/mL.

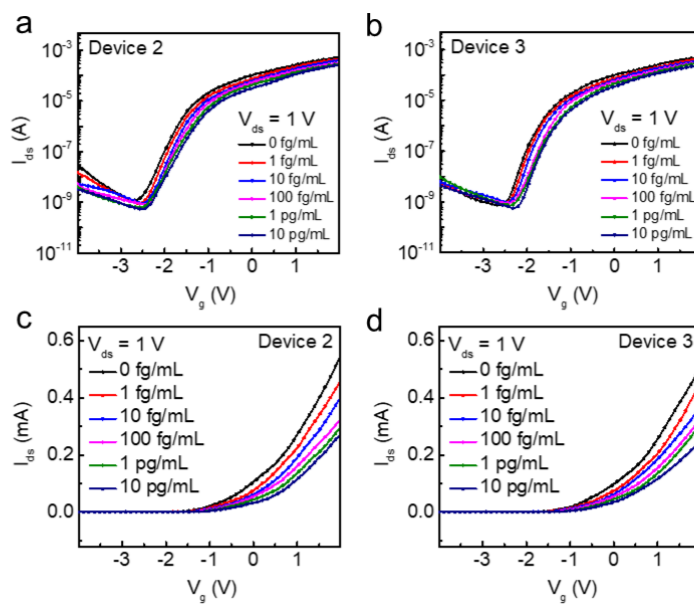


Fig. S8 Changes in (a-b) V_{th} and (c-d) I_{ds} of different devices at various PSA concentrations.

Table S1. I_{ds} and V_{th} values of three different devices at various PSA concentrations.

C_{PSA} (fg/mL)	Device 1 I_{ds} (mA)	Device 2 I_{ds} (mA)	Device 3 I_{ds} (mA)	Device 1 V_{th} (V)	Device 2 V_{th} (V)	Device 3 V_{th} (V)
0	0.259	0.261	0.264	-1.704	-1.698	-1.693
10^0	0.210	0.217	0.212	-1.678	-1.662	-1.678
10^1	0.189	0.199	0.192	-1.576	-1.577	-1.552
10^2	0.157	0.155	0.164	-1.497	-1.504	-1.471
10^3	0.135	0.133	0.140	-1.401	-1.398	-1.388
10^4	0.114	0.112	0.120	-1.313	-1.309	-1.310