

# Laser Illumination Adjustments for Signal-to-Noise Ratio and Spatial Resolution Enhancement in Static 2D Chemical Images of NbO<sub>x</sub>/IGZO/ITO/Glass Light-Addressable Potentiometric Sensors

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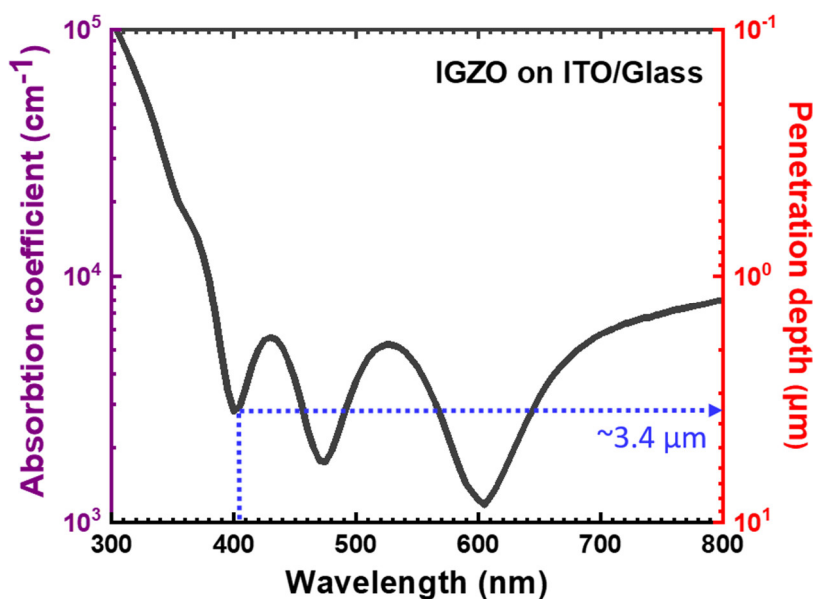
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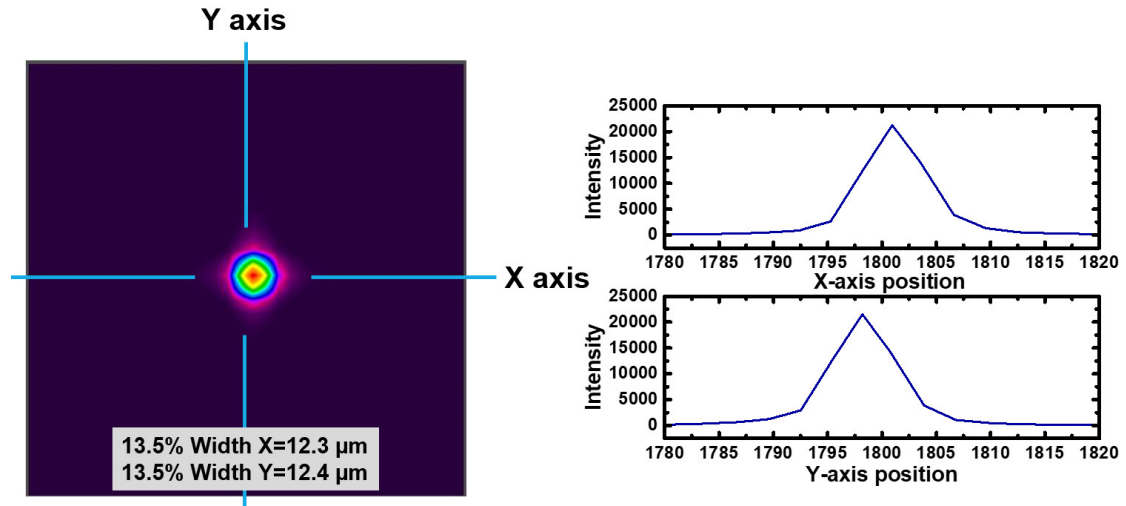
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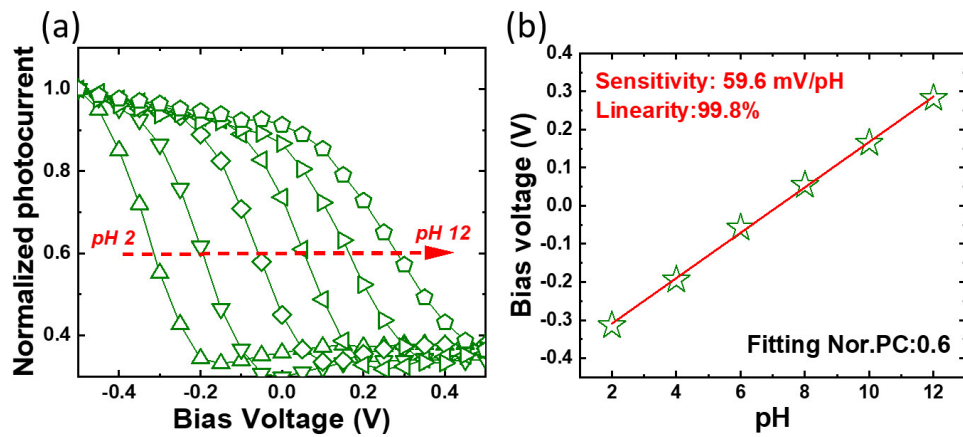
† Chun-Hui Chen, Neelanjan Akuli, and Yu-Jen Lu contributed equally to this work.



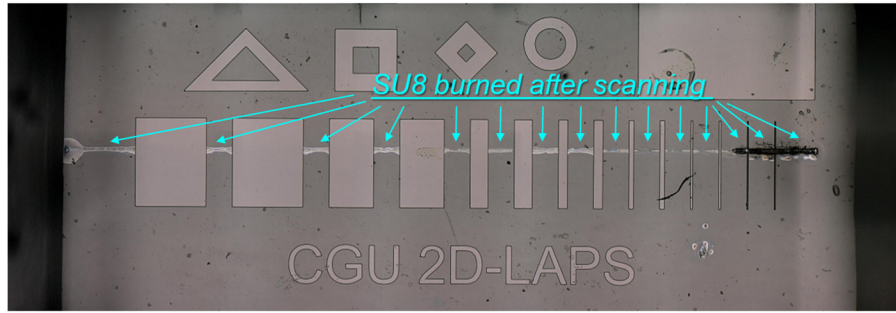
**Figure S1.** Optical absorption spectrum of this fabricated IGZO/ITO/glass sample. Calculated penetration depth is approximately 3.4 μm.



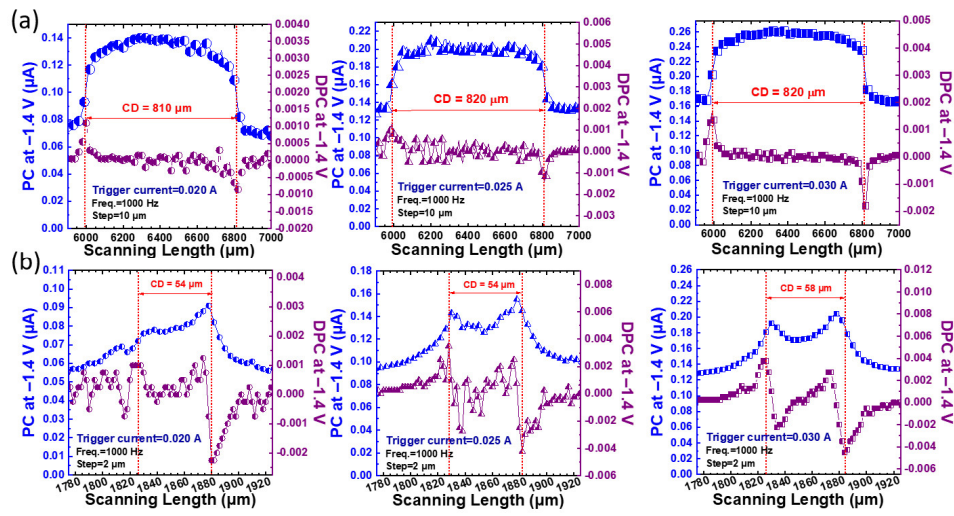
**Figure S2.** The dimensions of the 405 nm laser spot were controlled by the lens and focused to a minimum size of  $12.3 \times 12.4 \mu\text{m}$ , which was collected by a commercial beam profiler (NanoScan 2 s, Ophir Photonics, U.S.).



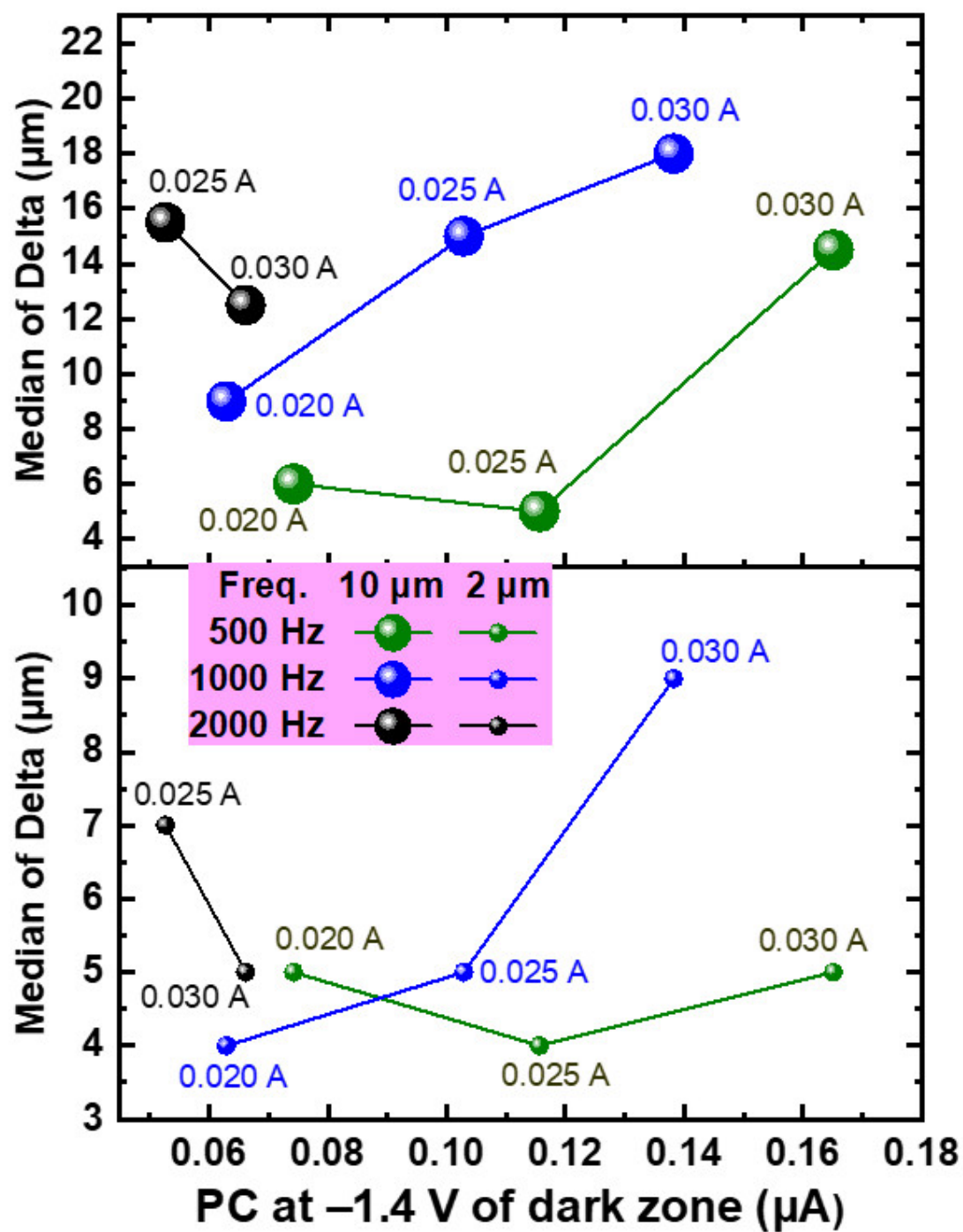
**Figure S3.** (a) Photocurrent versus bias voltage (PC-V) curves measured in various pH buffer solutions and (b) the calculated pH sensitivity and linearity by using the output voltage at the 60% of normalized photocurrent of this fabricated IGZO LAPS sample.



**Figure S4.** The damage area of the SU8–2005 layer was induced by an excessive heating effect of the absorption of a high-power 405 nm laser illumination with an intensity higher than 13 mW (e.g., trigger current of 0.035 A).



**Figure S5.** PC-SL plots of the patterns with width/spacing ratios of (a) 800/10  $\mu\text{m}$  and (b) 50/2  $\mu\text{m}$  at the same AC frequency of 1000 Hz and trigger currents of 0.020, 0.025, and 0.030 A, respectively.



**Figure S6.** Plot of the median delta CD and photocurrent measured at -1.4 V in the dark zone for all AC frequencies with step spacings of 10 and 2  $\mu\text{m}$ .