

## Supporting Information

### **Anisotropic Photoresponse Behavior in Single-crystal LaAlO<sub>3</sub>-based Vacuum-ultraviolet Photodetector**

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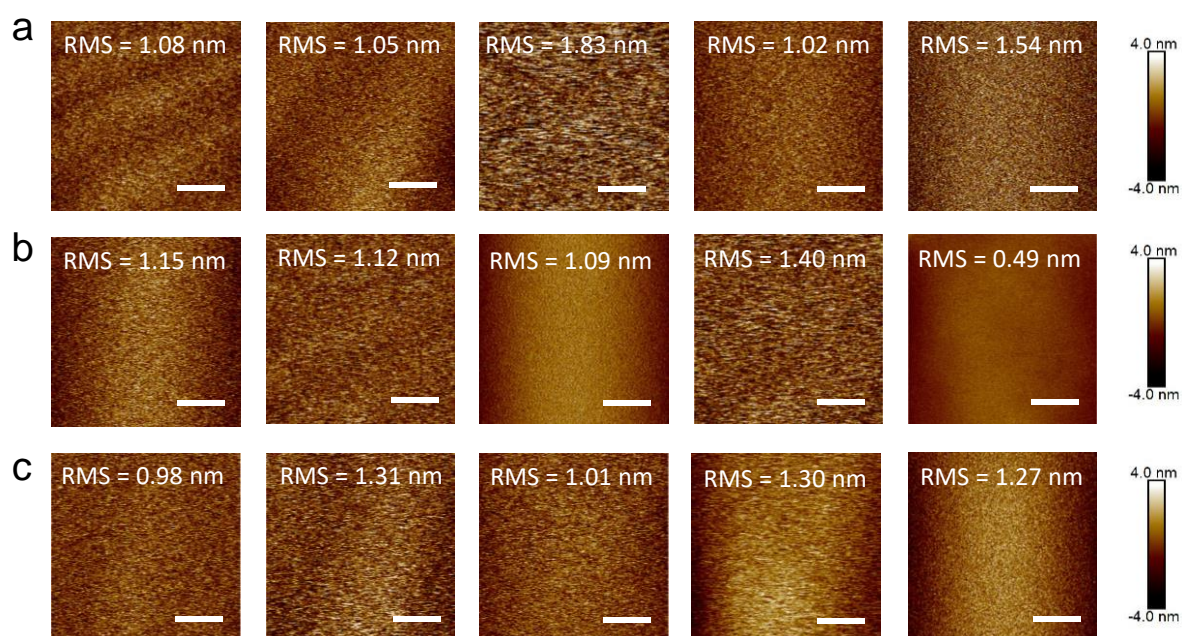
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**S1. AFM images of LaAlO<sub>3</sub> three different crystal planes (100), (110), and (111) and their corresponding roughnesses (RMS).**

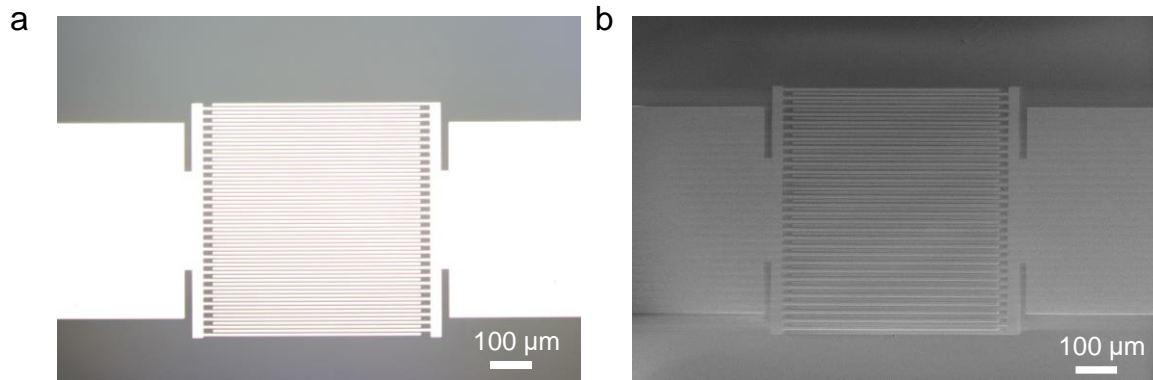
**Table S1.** Roughness measured at different wafer positions of the three wafers

Crystal plane	Roughness of Area 1	Roughness of Area 2	Roughness of Area 3	Roughness of Area 4	Roughness of Area 5	Average roughness
(100)	1.08 nm	1.05 nm	1.83 nm	1.02 nm	1.54 nm	1.30 nm
(110)	1.15 nm	1.12 nm	1.09 nm	1.40 nm	0.49 nm	1.05 nm
(111)	0.98 nm	1.31 nm	1.01 nm	1.30 nm	1.27 nm	1.17 nm



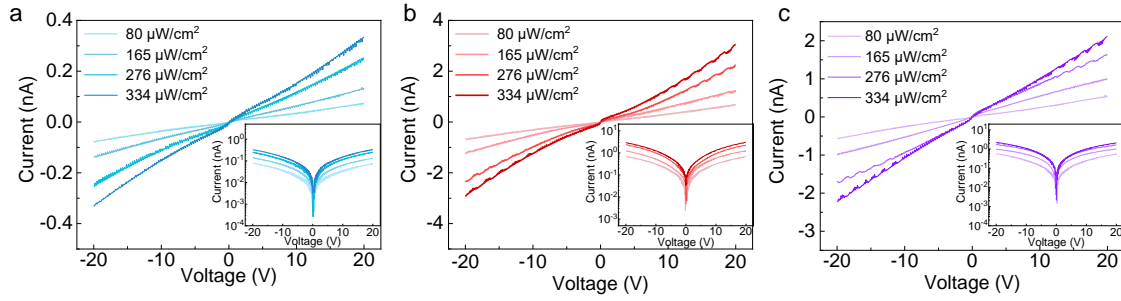
**Figure S1.** AFM images of three different crystal planes (a) (100), (b) (110), and (c) (111), each of them sampled five regions (scale bar, 500 nm).

## S2. Optical image and SEM image of the $\text{LaAlO}_3$ MSM PDs.



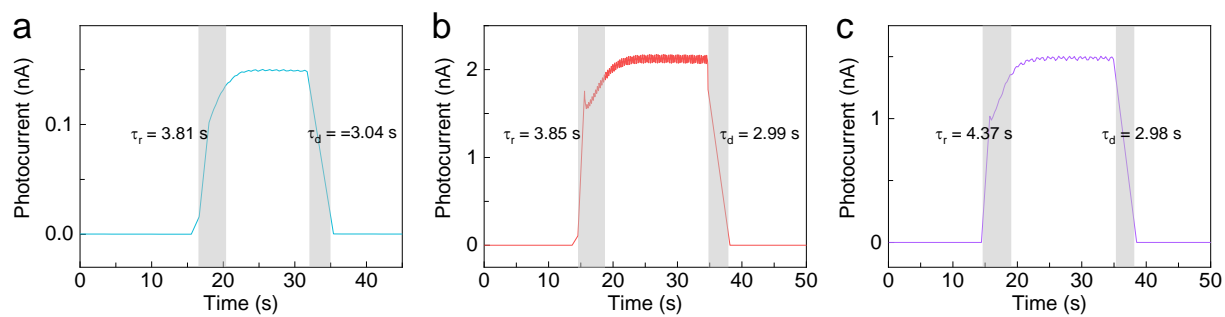
**Fig.S2** (a) Optical image and (b) SEM image of interdigitated-electrode with 5  $\mu\text{m}$  finger width on  $\text{LaAlO}_3$  single crystal.

**S3.  $I$ - $V$  measurements of the  $\text{LaAlO}_3$  MSM PDs with three different crystal planes (100), (110), and (111).**



**Figure S3.**  $I$ - $V$  characteristics of the  $\text{LaAlO}_3$  MSM PDs with three different crystal planes (a) (100), (b) (110), and (c) (111) under 185 nm illumination with different intensities. The inset plots the  $I$ - $V$  curves in the log form.

**S4.  $I_{photo}$ - $t$  measurements of the  $\text{LaAlO}_3$  MSM PDs with three different crystal planes (100), (110), and (111).**



**Figure S4.**  $I_{photo}$ - $t$  characteristics of different crystal planes (a) (100), (b) (110), and (c) (111).