

Electronic Supplementary Material (ESI) for Materials Advances.

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### Supplementary Information

#### **Photo-enhanced Metal-assisted Chemical Etching of $\alpha$ -Gallium Oxide Grown by Halide Vapor-Phase Epitaxy on a Sapphire Substrate and its Applications**

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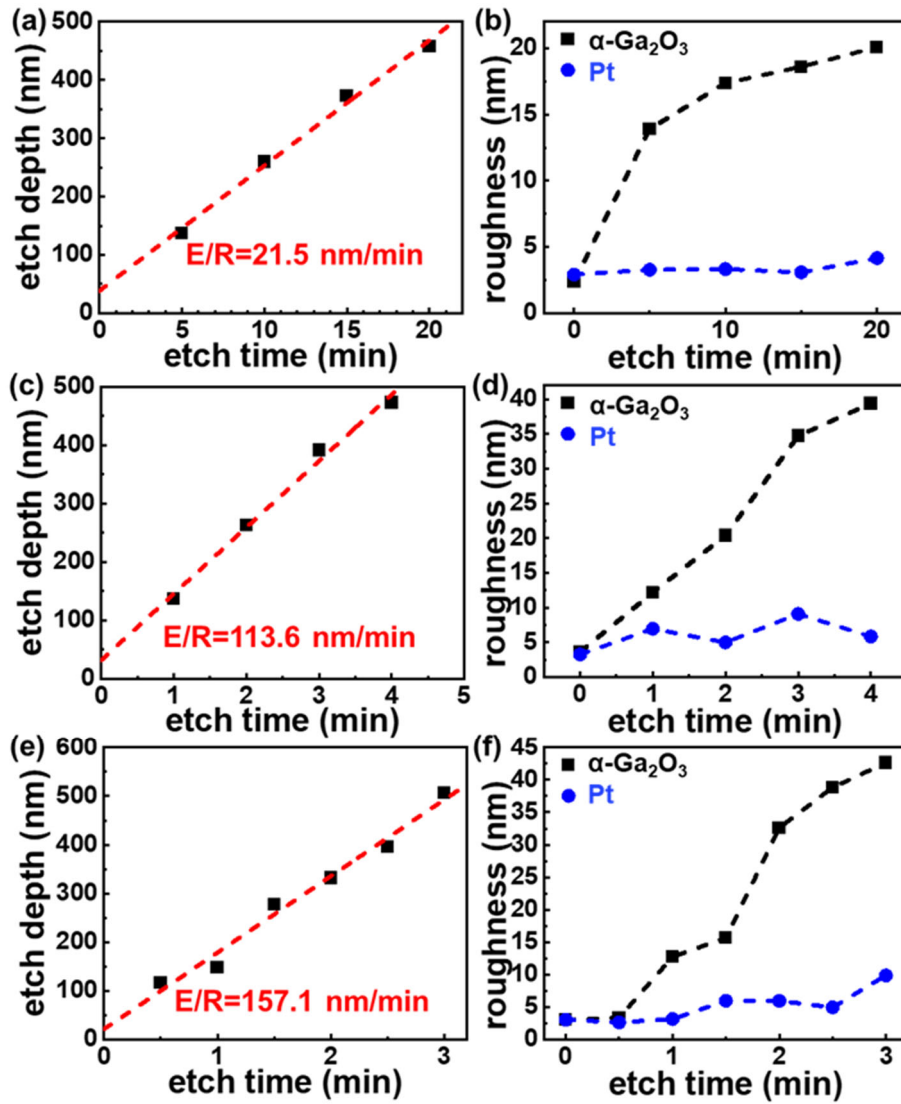
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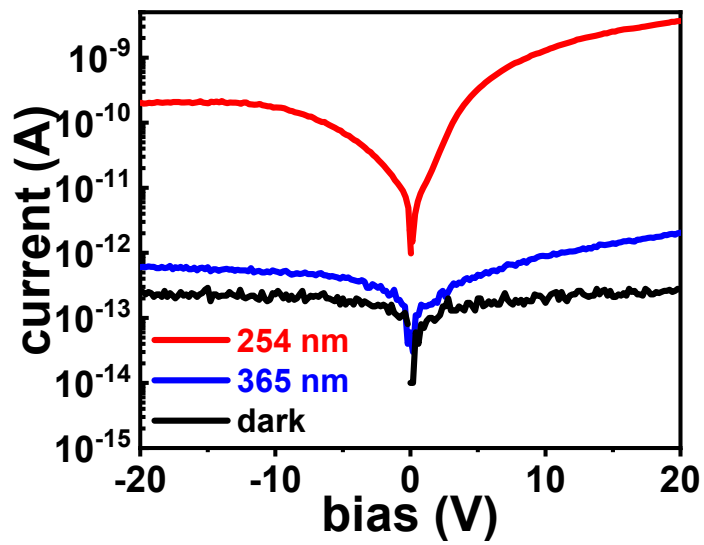
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**Figure S1.** (a) Etch rate (E/R) of PE-MAC etch of  $\alpha\text{-Ga}_2\text{O}_3$  at 32 °C. (b) RMS roughness changes at 32 °C etching. (c) Etch rate (E/R) of PE-MAC etch of  $\alpha\text{-Ga}_2\text{O}_3$  at 45 °C. (d) RMS roughness changes in 45 °C etching. (e) Etch rate (E/R) of PE-MAC etch of  $\alpha\text{-Ga}_2\text{O}_3$  at 50 °C. (f) RMS roughness changes in 50 °C etching.



**Figure S2.**  $I$ - $V$  characteristics of  $\alpha$ - $\text{Ga}_2\text{O}_3$  PD under dark condition as well as 254 and 365 nm lights illuminations.