Support Information

Al filament-induced unipolar resistive switching in sputtered Al-rich AlN memristors with low operating voltage and high memory window

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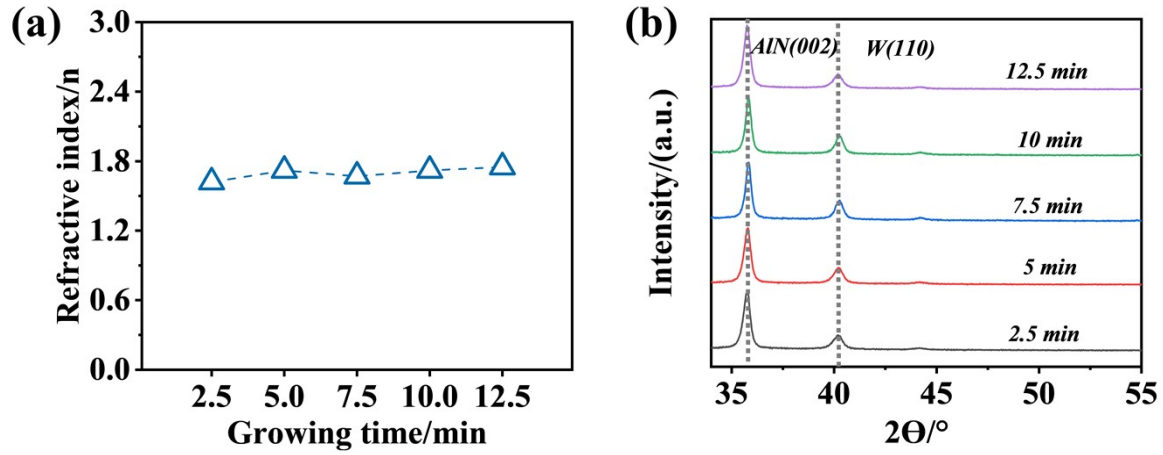

Figure 1. (a) Plot of Refractive index with growth time; (b) XRD patterns of AlN films.

Extending the growth time has a negligible variation on the refractive index as determined by spectroscopic ellipsometry, suggesting minimal impact on film quality (Figure 1 (a)). Additionally, the diffraction peaks near 36°, as depicted in the Figure 1 (b), exhibit excellent consistency, indicating a consistent (002) crystal orientation in the AlN films. The diffraction peak observed at approximately 40° corresponds to the (110) crystal orientation of W.

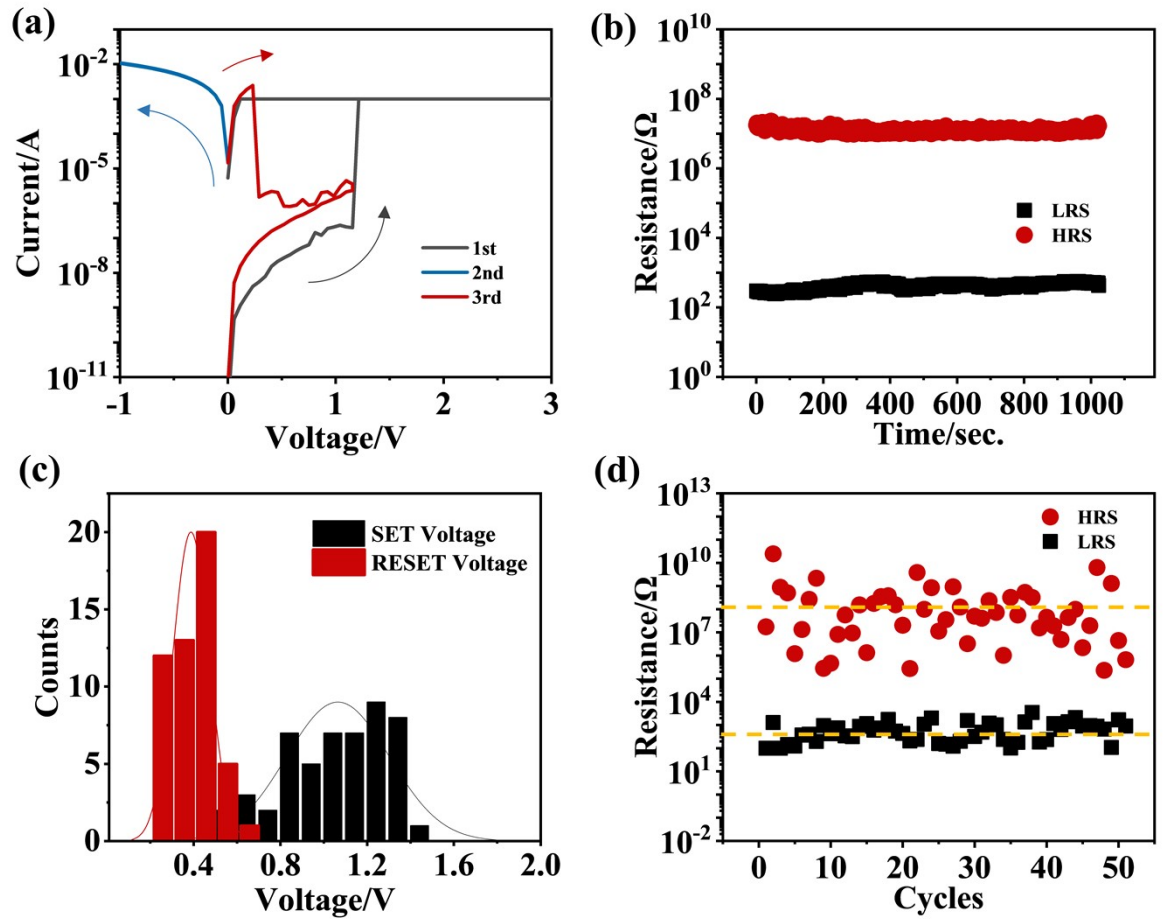

Figure 2. I-V resistive switching curves at the positive and negative voltage, (b) retention, (c) the unipolar SET and RESET voltage distribution histograms and (d) endurance of Al/AlN/W devices prepared at N_2/Ar ratio of 1:3.

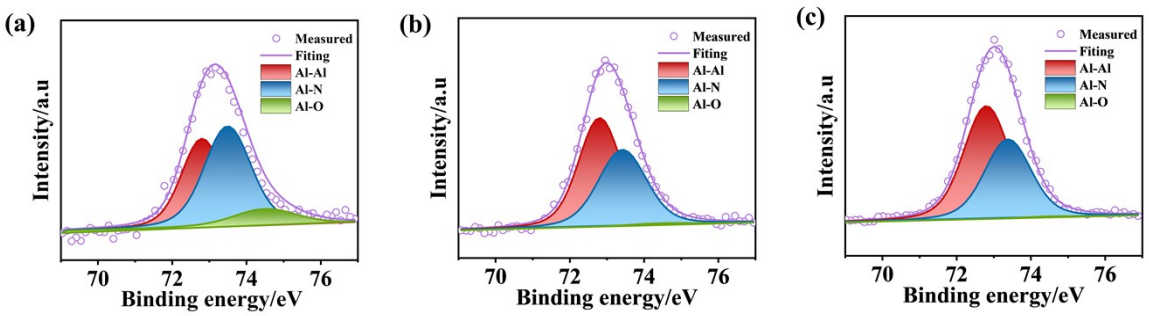

Figure 3. XPS spectra of the AlN film prepared under N_2/Ar ratio of (a) 2:1, (b) 1:1, (c) 1:2.