Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Supplementary Information for "*Eliminating surface effects via employing nitrogen doping for significantly improving stability and reliability of ZnO resistive memory.*"

Details about the forming processes of as-deposited and TA ZnO:N devices

The forming processes of as-deposited ZnO:N and TA ZnO:N devices are shown in Fig. S1(a).The forming process of TA ZnO:N can be operated with current compliance as low as 5 mA, while as-deposited ZnO:N needs minimum current compliance up to 15 mA. Moreover, the TA ZnO:N device needs larger forming voltage with more concentrative distribution than the as-deposited ZnO:N device, as shown in Fig. S1(b).

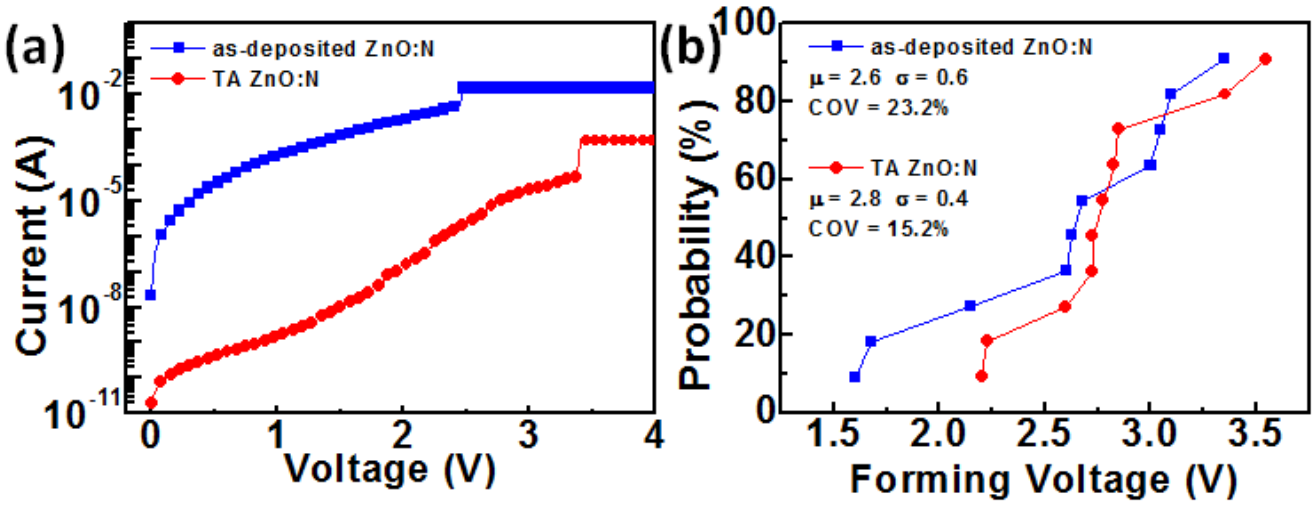

Figure S1. (a) Forming process and (b) distributions of forming voltage of as-deposited ZnO:N and TA ZnO:N devices.

XPS depth profile of related elements from as-deposited and TA ZnO:N samples

The XPS measurement combined with Ar ions sputtering with an etch rate of about 10 nm/min was conducted, as shown in Fig. S2. With the resolution of XPS, it is evident that nitrogen dopant is introduced in the prepared thin film. The observation of very high carbon surface contamination is due to the presence of carbonaceous contaminants found on virtually any specimen that has been exposed to the ambient. The carbon observed in the film could result from the trapped ligands from the metalorganic precursors during the ALD process.

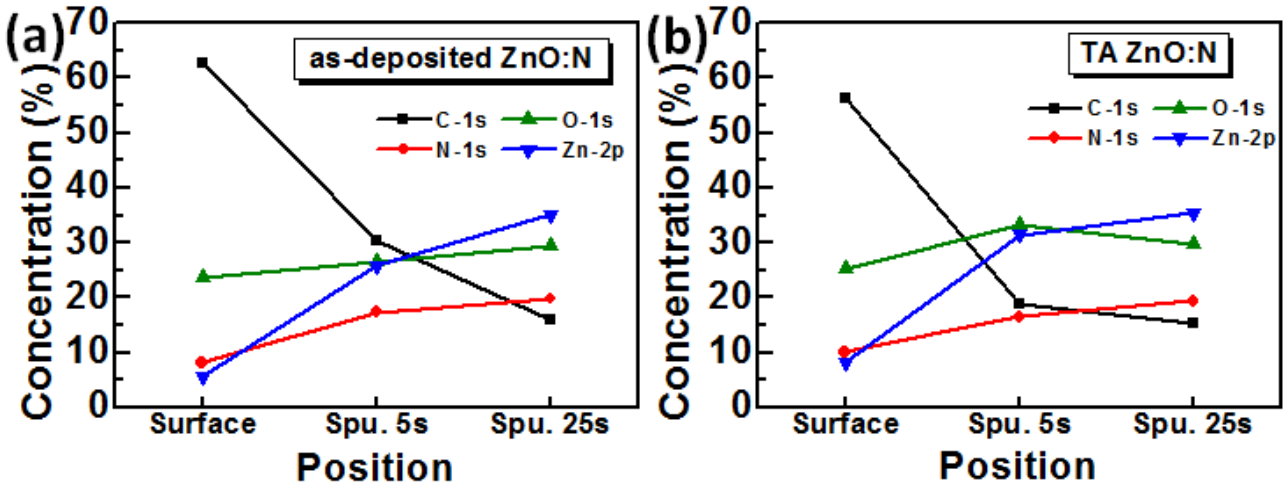

Figure S2. XPS depth profile of related elements from (a) as-deposited ZnO:N and (b) TA ZnO:N samples.