

Supporting Information for

Water Induced Zinc Oxide Thin Film Formation and its Transistor Performance

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1. XRD studies on ZnO powder.

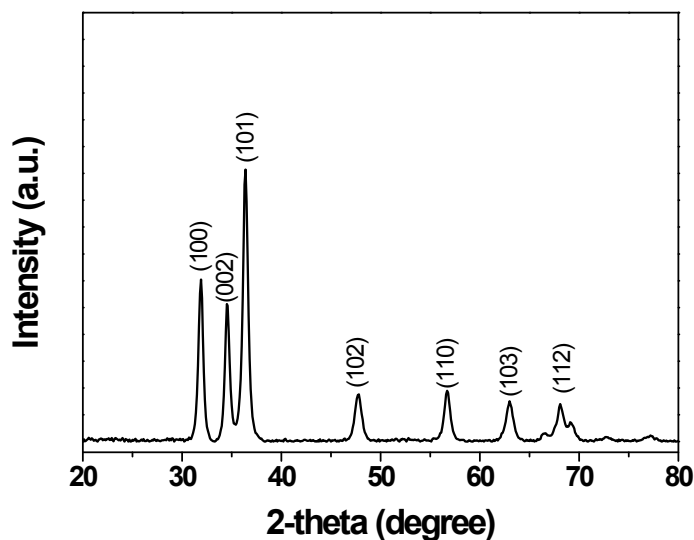


Fig.S1 X-ray diffraction pattern of the ZnO nanoparticle powder after annealing at 250 °C.

2. ZnO TFT transfer curve – the ZnO film annealed at 350 °C

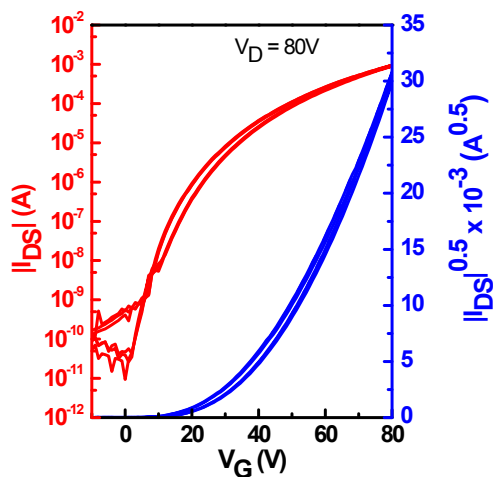


Fig. S2 Transfer characteristics of TFTs based on ZnO films annealed at 350°C and repeat for 3 times.

- In the case of water vapor assisted annealing, the polar water molecule absorbed on the ZnO surface, the oxygen dangling bonds on ZnO could accept electrons which cause electrons to accumulate at the surface. The bands are bent such that the surface electron density (surface conductivity) increases.^{S1}

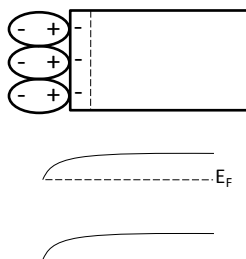


Fig. S3 Illustration of polar water molecule and ZnO interaction and ZnO band bending as results of water assisted annealing

4. ZnO TFT hysteresis

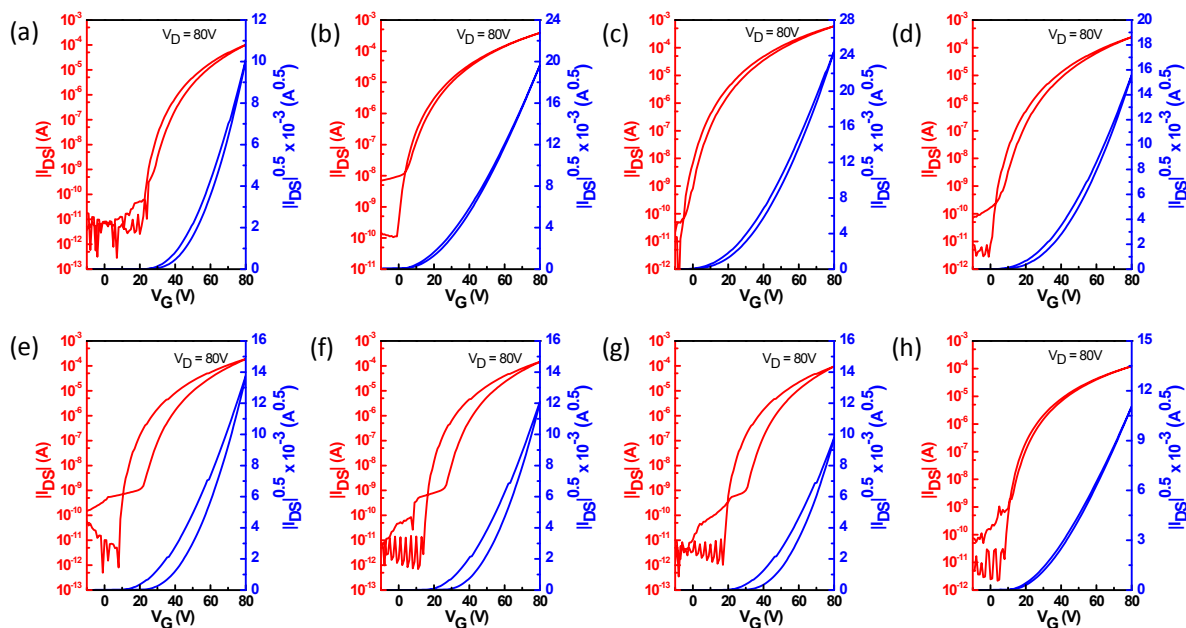


Fig.S4 The hysteresis voltage (V_h) from the typical transfer characteristics of the ZnO devices based on different conditions (dry annealing, water vapor annealing, and water volume ratio of 2%, 5%, 10%, 30% and 50%) (a-g). (h) The TFT device of (e) test in N_2 conditions.

5. Transfer characteristics of ZnO after one week in air

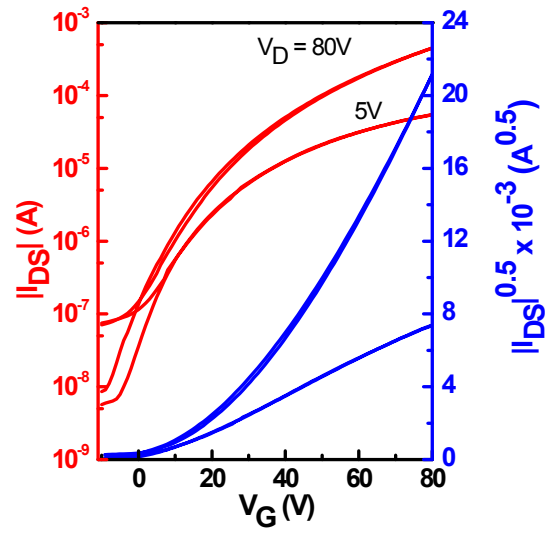


Fig. S5 Transfer characteristics of TFTs based on ZnO films after stored in air for one week.

Reference

S1. J.F. Boyle and K.A. Jones, Journal of Electronic Materials, 1977,**6(6)**, 717