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Simplified Process of In-Ga-Zn-O Thin Film Transistor Utilizing Selective Etching of Copper Source and Drain

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1 Introduction:

❑Features of Display:
1.High resolution
2.Increasing display Size.

❑Challenges:
1.Reduce energy consumption.
2.Reduce RC delay.
3.Avoid image distortion and shading.

Solution: Low resistive metal (Cu) for Source and drain electrode

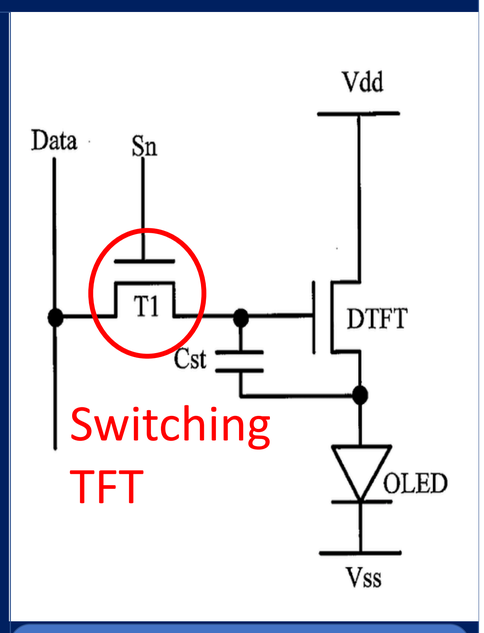


Fig. 1 : Pixel Circuit

2 Design of the proposed Device

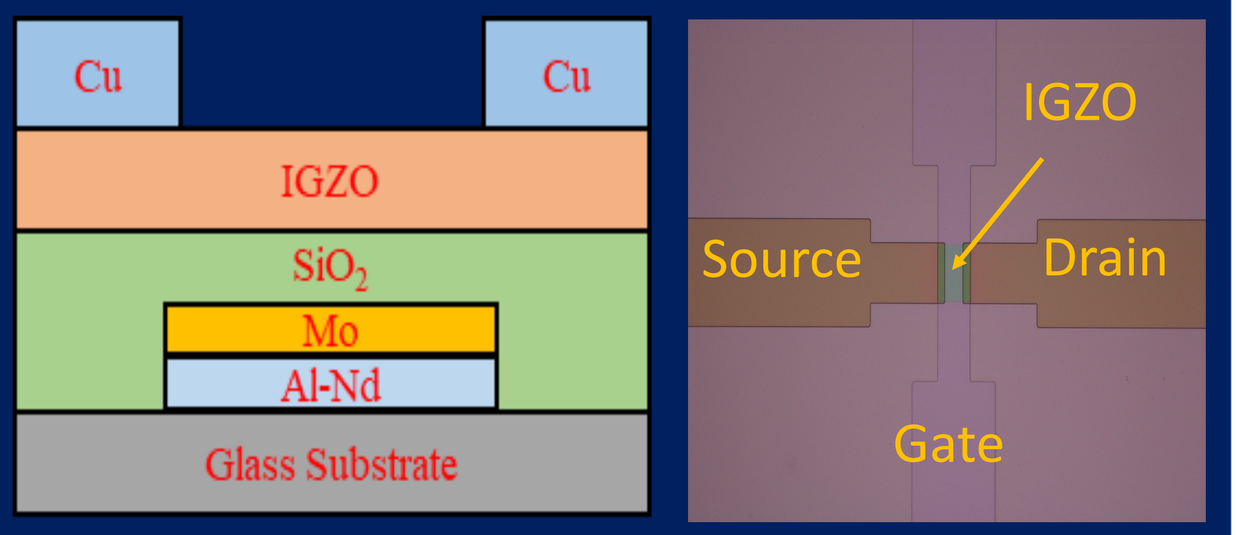


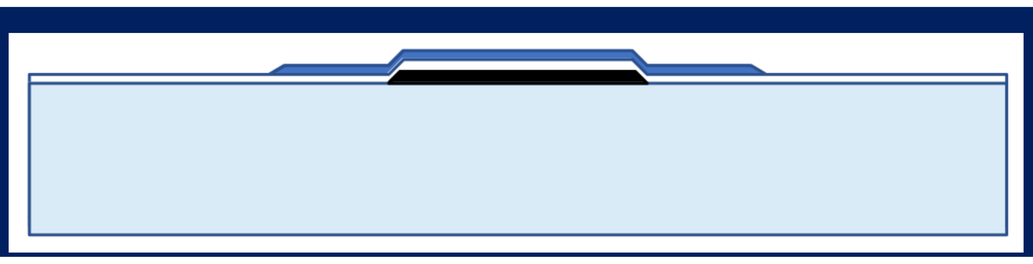
Fig. 2 : (a) Schematic diagram and (b) top view of IGZO TFT

3 Fabrication Process

(1) Gate (Al-Nd/Mo) deposition by DC SPuttering

(2) Gate patterning (Mask 1)

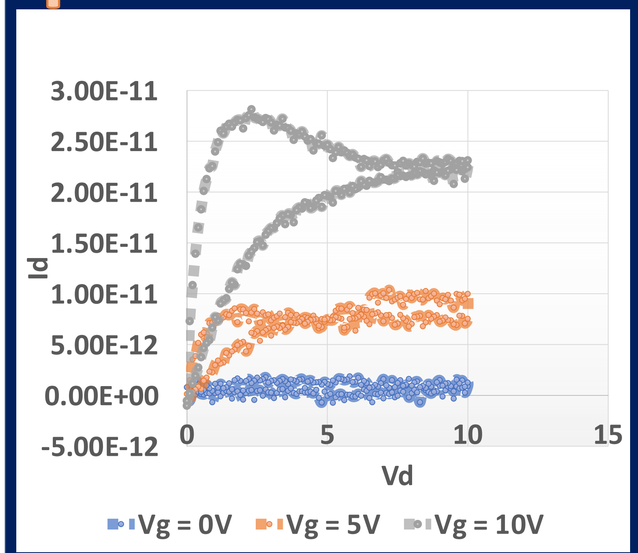
(3) SiO_2 (gate insulator) and IGZO (active layer) deposition by CVD and DC sputtering



(4) IGZO patterning by wet process (Mask 2) and then anneal at 300°C for 1H at N_2

(5) Cu deposition by thermal evaporation and patterning (Mask 3) with selective Cu etchant

4 Results & Discussion:



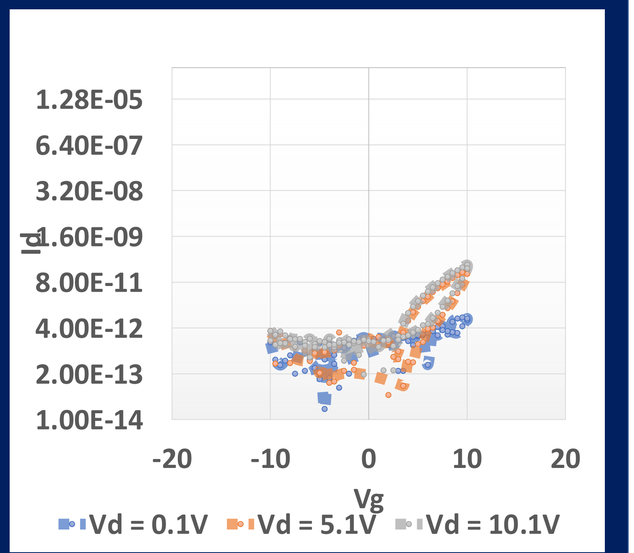
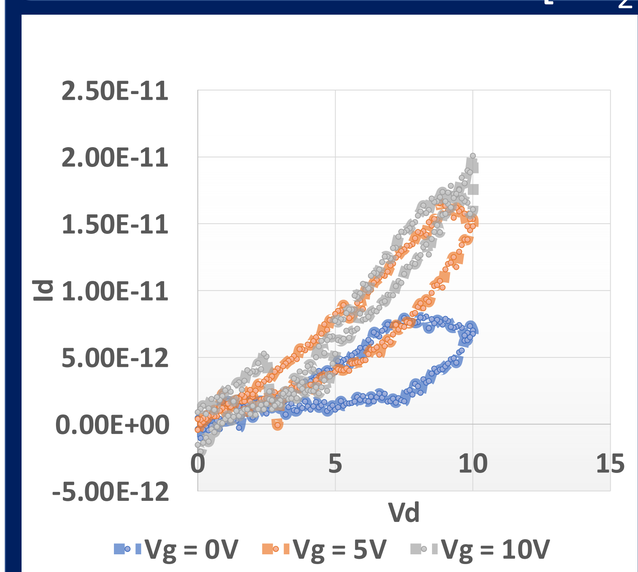


Fig. 3 (a) & (b): Output and transfer characteristics of IGZO [PO_2=1%] TFT.



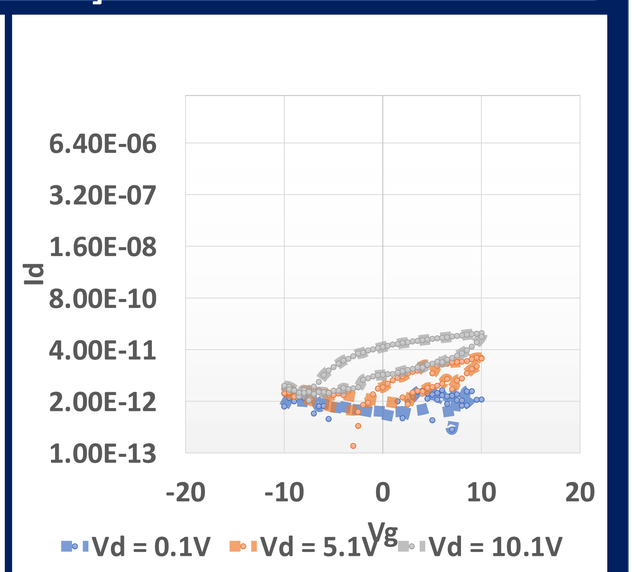


Fig. 3 (c) & (d): Output and transfer characteristics of IGZO [PO_2=5%] TFT.

5 Conclusion

❑ A proposed IGZO thin-film transistor fabricated successfully although the device performance is not in satisfactory level.

❑ Further improvement is needed to enhance device performance.

❑ K. Nomura, H. Ohta, A. Takagi, T. Kamiya, M. Hirano, and H. Hosono, "Room-temperature fabrication of transparent flexible thin-film transistors using amorphous oxide semiconductors," *Nature*, 2004.

❑ L. Lan *et al.*, "Influence of source and drain contacts on the properties of the indium-zinc oxide thin-film transistors based on anodic aluminum oxide gate dielectrics," in *Journal of Applied Physics*, 2011.