Self-aligned Coplanar Top Gate Indium Gallium Zinc Oxide Thin Film Transistors by DUV Irradiation

Seung-Man Ryu[1], Sung-Ho Jeon[1] and Duck-Kyun Choi[1]
[1]Dept. of Materials Science and Engineering, Hanyang University, Seoul 133-791, Korea
Tel.:82-2-2220-0506, E-mail: seungman20@hanyang.ac.kr

Amorphous indium-gallium-zinc-oxide (a-IGZO) has been intensively researched as a candidate material in thin film transistors to replace a-Si or poly-Si owing to superior electrical properties such as high mobility, high transparency, and low leakage current. The conventional bottom gate or top gate staggered etch-stopper structure has been widely used in on-panel displays. However, staggered structure is not attractive to apply for large area, high resolution on-panel displays because of critical drawbacks of both their high contact resistance by hetero-junction between active layer and source/drain regions and high parasitic capacitance of gate to source/drain due to the overlap between gate and source/drain electrodes. Therefore, self-aligned coplanar structure has been researched in various methods such as hydrogen, argon plasma treatment or diffusion of hydrogen during deposition of SiN_x by PECVD process to reduce contact resistance and parasitic capacitance. In this paper, self-aligned coplanar structured TFTs were investigated introducing DUV irradiation. DUV irradiation method has several advantages in room temperature process, low cost process and simple process compare to the conventional methods. The advantages of DUV irradiation in the self-aligned coplanar a-IGZO TFTs in the aspects of contact resistance and effective channel length will be discussed.

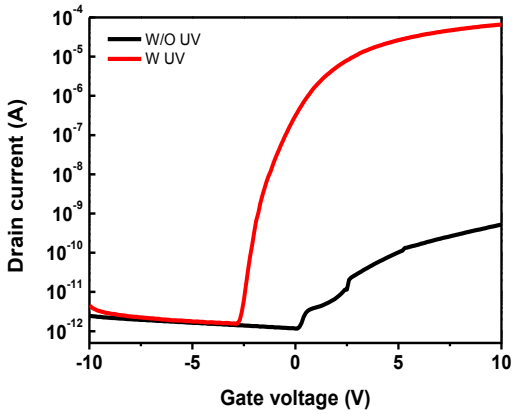

Fig. 1. Transfer characteristics of coplanar self-aligned top gate TFTs with DUV irradiation. (VD = 10V, W/L = 40/160)

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References

1. C. H. Wu, H. H. Hsieh, C. W. Chien, C. C. Wu, Display Technology, Journal of, 5(12), 515-519 (2009).
2. B. D. Ahn, H. S. Shin, H. J. Kim, J.S. Park, J. K. Jeong, Applied Physics Letters, 93(20), 203506-203506 (2008)