

# Fabrication of Improved ZTO TFT by Electrohydrodynamic-Jet Printing

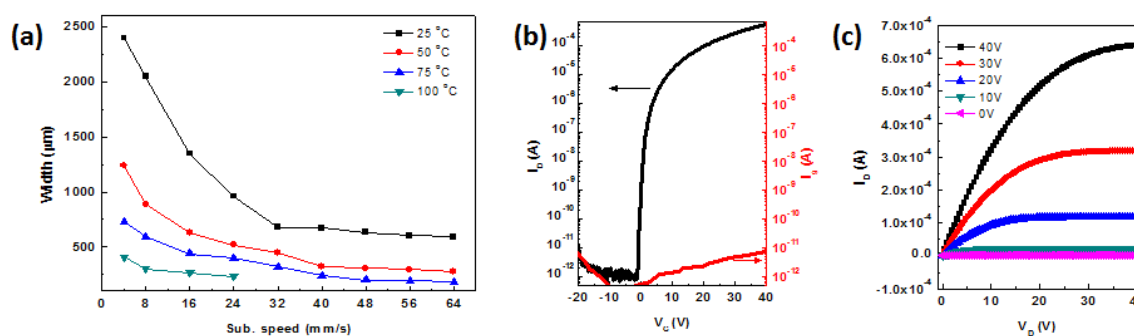
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Oxide Semiconductors have been paid attention to suitable TFTs for OLED because of higher mobility than a-Si TFTs, lower leakage current than LTPS TFTs and even low cost[1]. These oxide thin films can be obtained by simple solution process and applied to printed electronics. Printing process is a way to reduce cost and process time effectively over traditional vacuum process and photo-lithography by direct patterning. Nevertheless, semiconductor films, in most study of solution processed oxide TFTs, are fabricated by spin coating, which is inadequate for electronics industry[2]. For this reason, researches for various printing methods on oxide TFTs are needed certainly. Electrohydrodynamic-jet(EHD-jet) technique is available to form a fine pattern by electric fields between metal stage and tiny orifice tip[3]. We optimized an EHD-jet printing conditions for ZTO solution and fabricated ZTO TFT with better stable features than spin coated one.

Figure1-(a) shows the effects of speed and temperature of stage on printed pattern width. ZTO solution spread out on SiO<sub>2</sub> surface due to their high wettability, however, the line width was decreased as increasing the stage speed. As the stage temperature accelerated vaporization rate of solvent, printed pattern width was narrower and thicker. Thus, it is essential to optimize printing conditions for any solutions to obtain stable printing state. Figure1-(b) and (c) is a transfer curve and an output curve of EHD-jet printed ZTO TFT. EHD-jet printed TFTs showed similar electrical characteristics with spin coated ZTO TFT but improved contact resistance and leakage current. Electrical characteristics of ZTO TFT show a mobility of 6.9 cm<sup>2</sup>/Vs, an on-to-off current ratio of 4.7 x 10<sup>8</sup>, a threshold voltage of 7V and a subthreshold-swing of 0.4 V/dec.



**Fig. 1 (a)The effect of the speed and substrate temperature on the ZTO pattern width, (b) The transfer characteristic and (c) the output characteristic of EHD-jet printed ZTO TFT**

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## References

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