High mobility Amorphous Zinc Oxynitride Thin Film Transistors using UV/Ozone post-treatment below 175°C

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Amorphous Zinc oxynitride (a-ZnON) thin film transistors (TFTs) have recently paid attentions as next generated acive layers due to the high mobility (~ 100cm^2/Vs) and excellent photo-induced bias stability[1-4]. Since the report of a-ZnON TFTs in 2009[1], several previous studies of ZnON TFTs have been systemically investigated with not only physcal, chemical and electronical analysis but also electrical performances (mobility and bias-stability). Among those reports, the post annealing process such as temperature, ambient and other extra energy can be an important role due to the formation of stable O-Zn-N bonds[4], to fabricate the a-ZnON semiconductor film reliably.

In this study, ZnON TFTs was systematically investigated by using UV/ozone treatment and low temperature annealing (below 175°C) simulateneously. We fabricated a-ZnON TFTs by the DC-reactive sputtering method. To understand the effect of each post-treatment, ZnON films and their TFTs have been evaluated by using various chemical, physical, and electrical analysis. By optimizing UV, Ozone and thermal treatement simultanesouly, the ZnON TFTs exhibited threshold voltage of -1.66V, saturation mobility of 42.32cm^2/Vs, and subtrheshodl swing of 0.4V/decade. This presentation will discuss the correlation between device performances and post-treatment conditions.

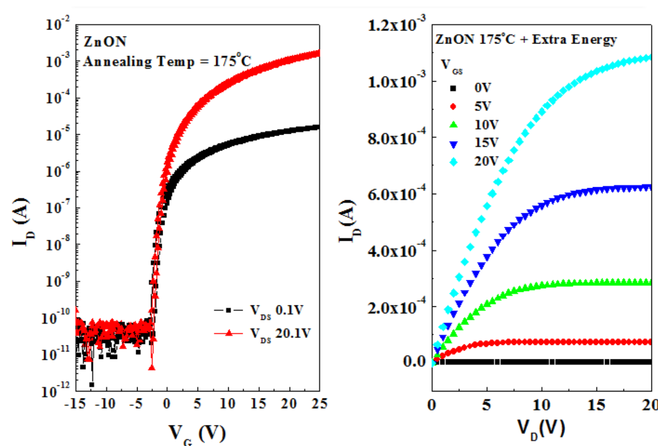

Fig. 1. (Left) Representative ZnON TFTs transfer curve, (Right) output curve

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