STUDY OF CHARACTERISTICS OF GIZO BASED TFT DEVICES IN THE SUB-MICRON SCALE

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Multi-component metal oxide semiconductors have gained a great deal of attention in the recent years due to a unique combination of several advantages both electronically and technologically. Among the many kinds of oxide semiconductors, which have been studied thus far, Ga_2O_3-In_2O_3-ZnO (GIZO) combines high mobility, controlled resistivity, steady amorphous phase and low processing temperature. The implementation of this semiconductor in thin film transistors (TFTs) has delivered devices with low off currents, high on/off ratio and very good overall performance [1].

Usually the fabricated TFTs are based in optical lithography and scaling down of such devices is limited. With this paper an investigation of the performance of GIZO-based devices in the sub-micron scale is presented with the fabrication bottom gate staggered TFTs (fig. 1) by incorporating electron beam lithography (EBL) for the realization of source and drain electrodes. The width (W) and length (L) of the transistor's gate are determined by the width of the electrodes and the distance between them respectively. For this work, several different W/L ratios were realized. TFTs were characterized electrically (transfer characteristic presented in fig. 2) and we have found that the produced devices had a mobility of around 50 m^2/Vs, low off current in the range of 10^{-11} A and a sub-threshold voltage slope of 0.35 V/dec.

References:

[1] P. Barquinha, A. Vilà, G. Gonçalves, L. Pereira, R. Martins, J.R. Morante, E. Fortunato, IEEE Trans. Elec. Devices 55 (2008) 954-960.

Figures:

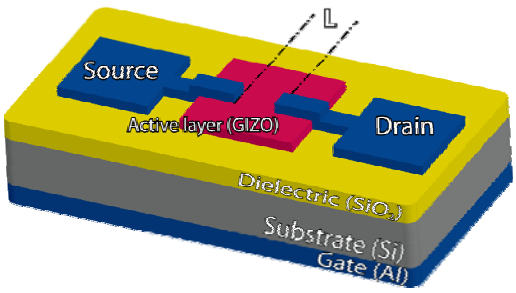

Fig. 1 Bottom staggered TFT

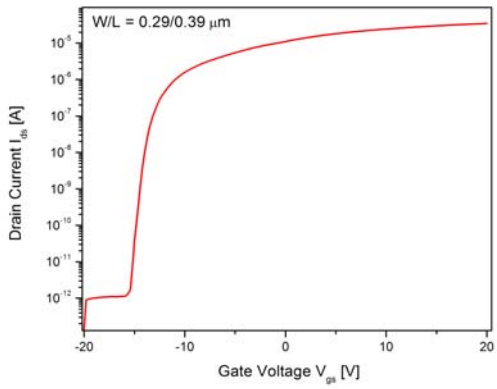

Fig. 2 Transfer characteristic of submicron TFT device