

SiO₂ Gate Insulator by RF Magnetron Sputtering with Various Oxygen Ratio

M. T. Hong^{1,2}, J. K. Kim¹, S. J. Moon¹, E. J. Yun³ and B. S. Bae^{1*}

¹Laboratory of Electron Device, Hoseo University, Asan City, Chungnam 336-795, Korea

*Tel.: +82-16-326-2658, E-mail: bsbae3@hanmail.net

²Dept. of Defense Science Technology, Hoseo University, Asan City, Chungnam 336-795, Korea

³Dept. of Information and Communication Engineering, Hoseo University, Asan City, Chungnam 336-795, Korea

The characteristics of thin film transistor (TFT) is greatly influenced by gate insulator properties. Typical parameters of TFT are electron mobility, threshold voltage and On/Off ratio which are influenced by gate insulator. Widely used material for gate insulator is SiO₂ which is rich in the earth and inexpensive. Plasma enhanced chemical vapor deposition (PECVD) is used for the deposition of the gate insulator to get the high quality insulator at the low temperatures below 400 °C. SiO₂ deposited by RF magnetron sputter has been investigated due to low deposition temperature [1] and reduction of both the investment and maintenance cost. The factors to affect the properties of the silicon oxide insulators are substrate temperature, RF power, pressure, oxygen mixing ratio during deposition of the oxide. The effect of the oxygen mixing ratio to Ar was investigated to improve the property of the oxide. Figure 1 shows the leakage currents of the oxide insulators for various oxygen mixing ratio from 0 % to 20 %. As graph shows breakdown voltage increased as O₂ mixture ratio increased from 0 % to 20 %. Since the deposition rate decreased as increasing oxygen ratio, we adjusted deposition time to set the thickness 150 nm under RF power of 150 W.

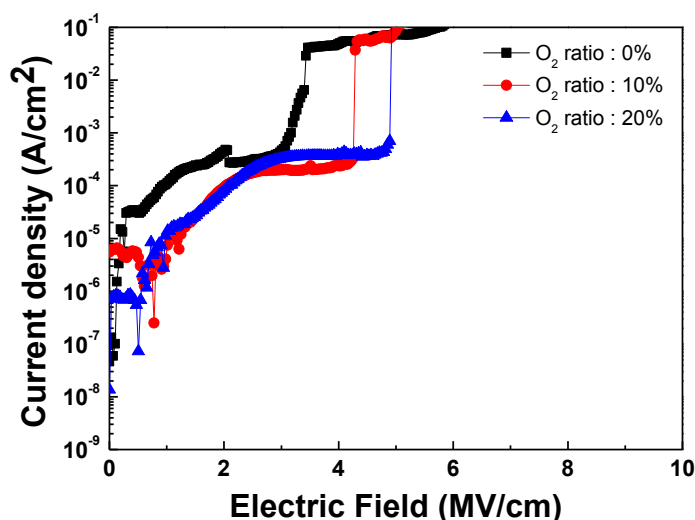


Fig. 1. Leakage current dependence on oxygen ratio during deposition

References

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