Effect of magnetic field on crystallization process of amorphous Si thin film using metal-induced lateral crystallization.

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There is a need for low temperature crystallization of amorphous Si thin film on glass substrate for integrated TFT-LCD. So, in recent years, many studies on poly-Si TFT have focused either on reducing the process time or on lowering the process temperature. Because of that reason, Metal-Induced Lateral crystallization (MILC) is a very advantageous method.[1,2]

Using MILC method, we can crystallize the amorphous Si at low temperature (<500℃). We studied the effect of magnetic flux on MILC process. As we applied magnetic field to a-Si, we could crystallize a-Si at lower temperature with faster crystallization rate than those of normal MILC rate (without magnetic field). First, 500Å thick a-Si thin films were prepared by Low Pressure Chemical Vapor Deposition (LPCVD) on the glass. And then, 50Å thick nickel, cobalt, or nickel/cobalt multi layer thin films were deposited selectively on the a-Si films by photolithography . While these samples were annealed at 550℃ on heat block , magnetic flux (from 0Gauss to 10000Gauss) was applied to these samples by the Vibrating Sample Magnetometer(VSM).

As applied magnetic flux, we could observe that MILC growth rate was increased by 10% to 700%. Also we investigated cobalt/nickel contents ratio effect on MILC under magnetic field, variation of Ni thickness, and dopant effect under magnetic flux on a-Si crystallization. We found that MILC growth rate was decreased as cobalt contents ratio was increased, and normally MILC growth rate was increased under magnetic flux. In addition, we investigated the effect of magnetic flux on the electrical characteristics of TFT.

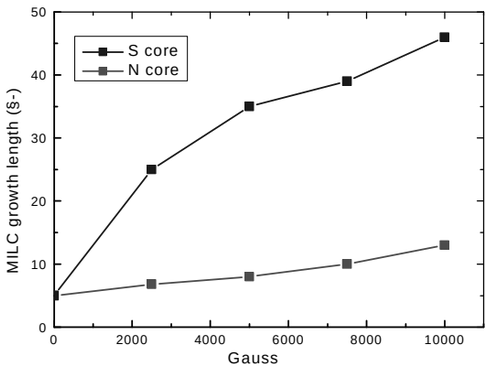

Figure 1 : MILC growth length with variation of magnetic flux

Reference

[1] S.W. Lee and S.K. Joo: IEEE Electron Device Lett. 17, 160 (1996)
[2] I.H. Ihn, T.K. Kim, B.I. Lee, and S.K. Joo: Microelectronics Reliability 39, p53 (1998)