【TP-01】

A New process for the Solid Phase Crystallization of a-Si by the thin film heaters

In-young Jung, Byoung Dong Kim, Nam Kyu Song, Seung-Ki Joo
School of Materials Science and engineering, Seoul National University,
Seoul 151-742, South Korea

In this study, a new process of fabricating the poly-Si thin films was developed. Recently, according to the rapid progress in Flat-panel-display industry, there has been a growing interest in the poly-Si process. Compared with a-Si, poly-Si offers significantly high carrier mobility, so it has many advantages to high response rate Thin Film Transistor.

We investigated unique process for high temperature Solid Phase Crystallization of a-Si without any damage on substrate glass using thin film heater which has very low thermal budget and enables selective area crystallization.

This thin film heater consists of 1000A-thick $TiSi_2$ thin films fabricated under the a-Si thin films. It was patterned by Photolithography to have 15mm-length and various line width from200 to 400um. SiO_2 separation layer was deposited by PECVD between thin film heater and a-Si films to prevent any interference with other film. The a-Si film was annealed by the heat transferred from the resistively heated thin film heaters.

By this method, we successfully crystallized 500Å-thick a-Si at a high temperature estimated above 850℃ in a few seconds without any thermal deformation of glass substrate. These surprising results were due to the very small thermal budget of the thin film heaters and rapid thermal behavior such as fastheating and cooling. Moreover, we investigated the time dependency of the SPC of a-Si film by observing the crystallization phenomena at every 20seconds during the a-Si film being annealed by the thin film heaters. We will also show the individual managements of nucleation and grain growth steps of poly-Si in SPC of a-Si with the precise control of annealing temperature.

In conclusion, we will show the SPC of a-Si by the thin film heaters and many advantages of the thin film heater annealing over other processes