

Ni Induced Crystallization of Amorphous Silicon by Using Silicon Wafer as Crystal Growth Seed

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It is well known that Ni can reduce the crystallization temperature of amorphous silicon (a-Si). This is commonly called Ni-metal- induced lateral crystallization (MILC).¹⁻³ However, in MILC, not all a-Si film was transformed to crystal Si (c-Si). Some regions between the needlelike Si grains remained uncrystallized.^{4,5} Besides, the grain size of poly-Si films was very small (< 1000 nm). Since grain boundaries would degrade the TFT performance, intensive studies have been made to increase the grain size of MILC poly-Si.^{6,7}

In this study, Ni-induced crystallization of a-Si by using Si wafer as seed was investigated. A 2-nm-thick Ni film was deposited on the back of the Si wafer and then contacted to a 100-nm-thick patterned a-Si film on oxide surface. The schematic diagram was illustrated in Fig. 1. Samples were then annealed at 550°C.

Fig. 2 shows the large grain of the poly-Si in the patterned a-Si film (active layer). The average grain size was about 50µm. Fig.3 shows the Raman spectra of the poly-Si films. Both results show that crystallinity of Si film by using Si wafer as crystal growth seed was better than that of normal MILC.

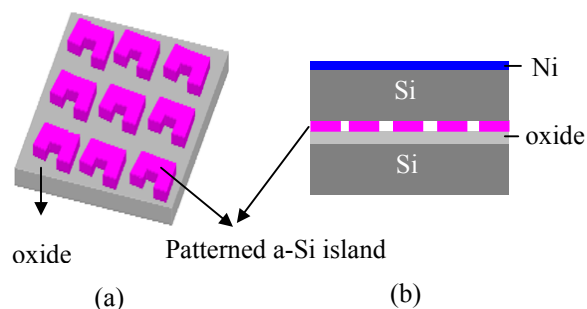


Fig.1 The schematic diagram of (a) the patterned a-Si island and (b) the cross section of the contacted sample.

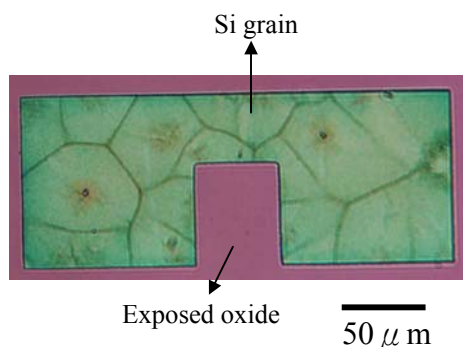


Fig.2 The OM image of the large grain of the poly-Si in the active layer

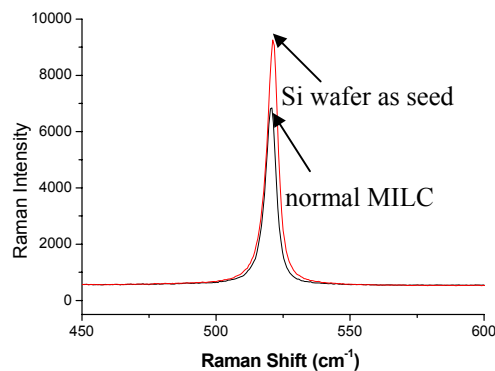


Fig.3 the Raman spectra of the two Si films annealed at 550°C.

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