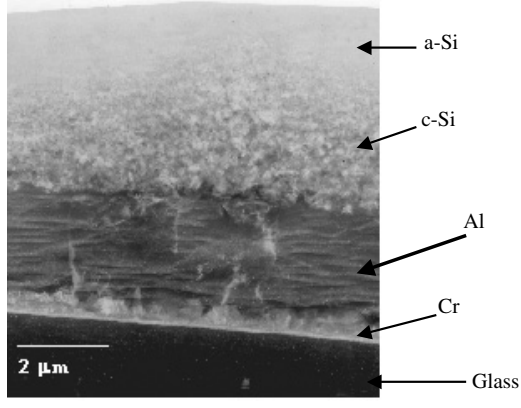
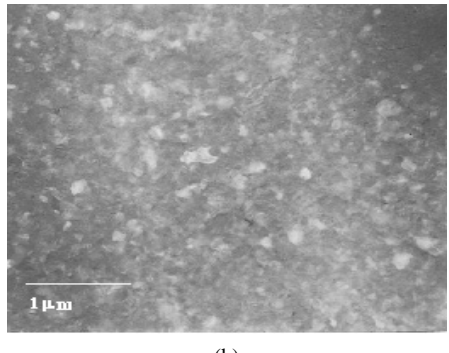


(a)



(b)

Figure 8.29 TEM photos of a partially crystallized Si film showing (a) start of nucleation and grain growth from the Al interface in cross-section; and (b) grain size distribution near the Si–Al interface in plan view

regions around the Al/Si interface may still occur. This local melting will induce crystallization at the interface area, and this crystallization can be much stronger than the crystallization caused by Al-Si intermixing at a solid phase.

- For thick samples, once the initial crystallization has occurred, it is possible to continue crystallization and grain enhancement via injection of defects. It is believed that in this process vacancies are injected into Si, especially when temperature is below 450°C, which can promote grain growth. This could suggest that following a high-temperature dwell, the optical power could be reduced to stimulate grain enhancement.

One may think that a preferred approach for crystallization would be to deposit the a-Si film at a higher temperature and then use optical processing. However, results to date seem to indicate that the effect of optical processing is somewhat diminished, if the film is deposited at higher temperatures. Thus, contrary to intuition, low-temperature deposition appears to favor crystallization during optical processing. One may explain this behavior by assuming that the formation of thick Al-rich alloyed layer retards vacancy injection. More research needs to be done to understand behavior of point-defect injection.