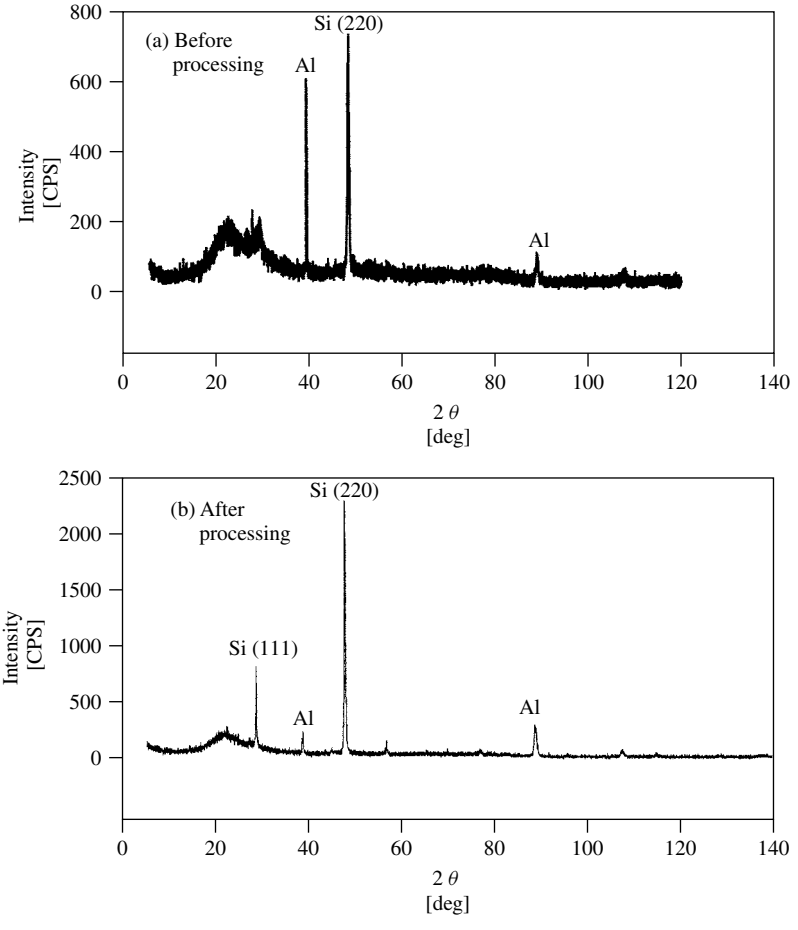

Figure 8.27 XRD spectrum of a 2-μm-thick HWCVD Si film, deposited on Al/Cr/glass at about 500°C (a) before optical processing; and (b) after optical processing at ~480°C for 3 min. A significant increase in Si (220) compared to Si (111) orientation can be seen in (b)

toward a-Si. From this figure, it is clear that 3 min of optical processing time was not sufficient to crystallize the entire film at 460°C. Figure 8.29(b) is a TEM plan view of the film showing distribution of grain sizes near the Si–Al interface.

Detailed profiling of Al across the crystallized films, done by SIMS (secondary ion mass spectroscopy) and micro-X-ray, showed that in optically crystallized films the Al concentration dropped by several orders of magnitude within about 1 μm from the Al-Si interface [81, 83]. These results indicate that Al is required only for the initiation of crystallization. After the nucleation, the crystallization front propagates into a-Si while grain enhancement occurs in the crystallized film. It is believed that vacancy injection from Al-Si interface is responsible for grain enhancement.

Investigation of the possibility of applying optically assisted MIC showed that crystallization of a-Si can start at about 200°C in less than 3 min. This crystallization