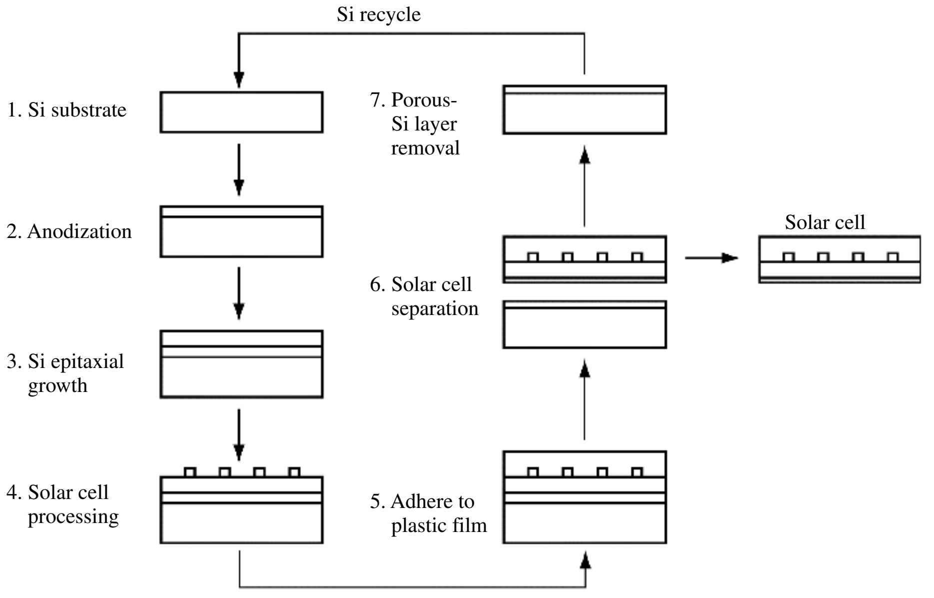

Figure 8.8 A schematic of various process steps involved in the use of porous Si as a separation layer

The third technique, called *epilift*, consists of depositing an epilayer on a patterned single-crystal wafer through a mask with openings along <110> directions [42]. The masking layer is exposed in a mesh pattern; the lines are 2 to 20 μm wide and spaced 50 to 100 μm apart. The growth faces have an (111) orientation, and the layer has a diamond cross-section giving it an antireflection texture. Figure 8.9 is a schematic of the cell configuration. Although this approach appears to have been commercialized, to date no cell performance has been reported.

8.2.2 Multicrystalline-Si Substrates

Thin Si films can be deposited on a multicrystalline Si (mc-Si) substrate by an epitaxial process. The general objective is to use a low-cost, large-grain, cast-Si wafer, such as a metallurgical grade feedstock, as the substrate and to deposit a high-quality thin layer on it. The epitaxially grown layer would be low in impurity content, as well as in crystallographic defects [43, 44]. There is interest in the use of liquid-phase epitaxy, as well as other vapor-phase deposition techniques for high-growth-rate. Some of the issues in this method include impurity contamination from the low-cost substrate, different growth rates of different grains, and prevention of substrate defects from propagating into the film.

One of the major problems in this method is that the solar cell is not amenable to efficient light-trapping designs because the backside becomes a Si–Si interface with little or no discontinuity in the refractive index for high reflectance from this interface.