

Surface modification via wet chemical etching of single-crystalline silicon for photovoltaic application

Abstract

The potential of solar cells have not been fully tapped due to the lack of energy conversion efficiency. There are three important mechanisms in producing high efficiency cells to harvest solar energy; reduction of light reflectance, enhancement of light trapping in the cell and increment of light absorption. The current work represent studies conducted in surface modification of single-crystalline silicon solar cells using wet chemical etching techniques. Two etching types are applied; alkaline etching (KOH:IPA:DI) and acidic etching (HF:HNO₃:DI). The alkaline solution resulted in anisotropic profile that leads to the formation of inverted pyramids. While acidic solution formed circular craters along the front surface of silicon wafer. This surface modification will leads to the reduction of light reflectance via texturizing the surface and thereby increases the short circuit current and conversion rate of the solar cells.

Keywords

Acidic etching; Alkaline etching; Efficiency; Silicon solar cell; Surface texturization