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Influence of Metal Assisted Chemical Etching on c-Si Wafer

Although there are many factors that degrade solar cell efficiency, this paper primarily focusses on optical losses. The optical losses can be minimized by texturing process that reduces the reflectance by lengthening the path length of the light. For lower cost, as the thickness of the wafer decreases, wet texturing, which consumes a large amount of silicon is difficult to apply to thin wafers. To solve this, the texturing process was carried out by metal catalyst chemical etching(MACE) with a small etching amount. The Ag deposition was carried out using E-beam Evaporator. The process was carried out by first depositing 7 nm Ag on the wafer followed by a 3 minute etching step. During each etching process, the ratio of HF : H2O2 : H2O was varied. We obtained the lowest reflectance of 11.41% under the condition of HF : H2O2 : H2O = 1 : 5 : 10. After optimizing the ratio of the etching solution, Ag was deposited with a thickness of 7 to 13 nm. The deposited wafer was etched for 1 to 5 minutes with HF : H2O2 : H2O = 1 : 5 : 10 solution. As a result, reflectance of 9.37% was observed at etching time of 4 minute and thickness of 7 nm. It was confirmed that thickness of 10 nm exhibited higher reflectance than thickness of 7 nm, and the reflectance was 11.07% at 5 minute. The lowest reflectance of 7.41% was obtained in condition of 13 nm and 3 minute.

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