



Development of dye-sensitized Solar Cell Module with a reflector of micro structures

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Abstract

Recently, The Solar Cell Energy is presently promising because of Oil Inflation, fuel exhaustion, global warming and space development. Many advanced countries rapidly develop the solar cell energy under a nation enterprise. Particularly, Dye-sensitized solar cell (DSC) that is the 3rd generation solar cell has low-cost of manufactures about 1/3~1/5 times compared with the silicon solar cell. Accordingly, the DSC is constantly researched globally.

In this paper, we have studied a reflector recovering the loss light for improvement conversion efficiency of DSC. The reflector angle was determined by optical analysis program. Micro pyramid patterns with the 112.6° were processed using the ultra precision shaping machine in order to maximize the conversion efficiency due to increasing light distance. In addition, a comparative study carried out about the conversion efficiency. We made the DSC that is attached reflector with mirror angle 112.6° below. We measured conversion efficiency of solar cell by solar simulator that can irradiate 100mW/cm² (1Sum, AM 1.5).

As a result of this experiment, the DSC with micro pyramid mirror improves efficiency about 2% against the DSC with black plate. Reflected light can cross more dye of TiO₂ Layer. Therefore, Voltage of maximum power (V_{mp}) increases other reflector with different mirror angle.

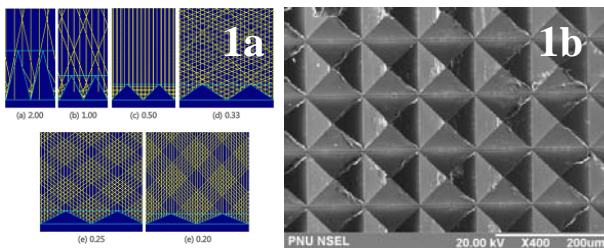


Figure 1: a) Computing calculation of mirror angle. b) Machined reflector with micro pyramid structure.

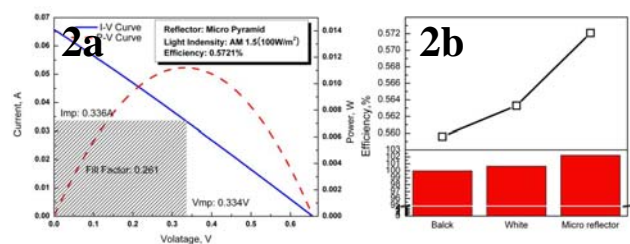


Figure 2: a) I-V and P-V curve of micro pyramid reflector. b) Comparison efficiency of each parameter.