

Investigation of Al Back Contact and BSF Formation by In-situ TEM for Silicon Solar Cells

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The trend to thinner crystalline silicon solar wafers in production of solar cells investigates re-evolution of back surface field (BSF) formation. We have studied mechanisms of back contact formation in Al evaporation and screen printed Al paste for Si solar cells by TEM analysis. We observed that Si diffuse into Al during heat up. The Si diffusion process made vacancies in Si wafer. The Al began to seep into the Si wafer (Al spike). During heat down, the Al spike were shrink which causes the doped region (BSF).

Key words : Al BSF (알루미늄 후면전계), In situ TEM, 스크린 프린트 태양전지(Screen printed solar cells)

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태양전지 텍스처 표면구조 개선 및 빛 흡수효율 향상에 관한 연구 - 식물 잎의 표면구조 적용 -

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A study on improving the surface structure of solar cell and increasing the light absorbing efficiency - Applying the structure of leaves' surface -

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Biomimetic is a new domain of learning that proposes a solution getting clues from nature. There seems to be a sign of this phenomenon in fields of Renewable Energy. For example, Wind power was imitate the whale's fin that was improve efficiency of generating energy.

This study focused on the photovoltaic generation as the instance of applying biomimetic. Efficiency is the most important factor in field of Photovoltaic generation. When given solar cell taking the sun light, most important fields of the study are absorb more light and increase the quantity of generation.

For improving efficiency, the solar cell were builded up textures of taking a pyramid form, such a surface structure taking a role for remaining the light. This effects do the role as increasing absorbing efficiency. Such phenomenon calls Light Trapping, locking up the light on the surface of solar cell for a long time.

Light is a vital factor to plants in the nature. Plants grow up through the photosynthesis that absorbing light for growth and propagation. So, plants make a effort how can absorb more the light in poor surroundings. This study set up a goal that imitates the minute surface structure of plants and applies to the existing solar cells's surface structure, so it can improve the efficiency of absorbing light.

We used Light Tools software analyzing geometrical optics to analyze efficiency about new designed textures on the computer. We made a comparison between existing textures and new designed textures. Consequently, new designed textures were advanced efficiency, absorbing rates of light increasing about 7 percent. In comparison with existing and new textures, advancing about 20 percent in the efficient aspect.

Key words : Solar cell(태양전지), Biomimetic(생체모방공학), Light trapping(빛 가둠), ray tracing simulation(광선추적분석)

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