## 결정질 실리콘 태양전지에 적용하기 위한 후면전극 형성에 관한 연구

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## An Analysis on rear contact for crystalline silicon solar cell

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There are some methods for increasing efficiency of crystalline silicon solar cells. Among them, It is important to reduce the recombination loss of surface for high efficiency. In order to reduce recombination loss is a way to use the BSF(Back Surface Field). The BSF on the back of the p-type wafer forms a p+layer. so, it is prevented to act electrons of the p-area for the rear recombination. As a result, the leakage current is reduced and the rear-contact has a good Ohmic contact. therefore, open-circuit-voltage and Fill factor(FF) of solar cells are increased. This paper investigates the formation of rear contact process comparing Aluminum-paste(Al-paste) with Aluminum-Metal(99.9%). It is shown that the Aluminum-Metal provides high conductivity and low contact resistance of 21.35mΩcm using the Vacuum evaporation process but, it is difficult to apply the standard industrial process because high Vacuum is needed and it costs a tremendous amount more than Al-paste. On the other hand, using the Al-paste process by screen printing is simple for formation of metal contact and it is possible to produce the standard industrial process. however, it is lower than Aluminum-Metal(99.9) of conductivity because of including mass glass frit. In this study, contact resistances were measured by 4-point prove. each of contact resistances is 21.35mΩcm of Aluminum-Metal and 0.69mΩcm of Al-paste. and then rear contact have been analyzed by Scanning Electron Microscopy(SEM).

**Key words :** BSF(후면전계), crystalline solar cell(결정질 태양전지), Rear recombination(후면재결합), Aluminum paste(알루미늄 페이스트)

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## 결정질 실리콘 태양전지의 고효율 화를 위한 Selective emitter 구조 및 Ni/Cu plating 전극 구조 적용에 관한 연구

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## PA study on selective emitter structure and Ni/Cu plating metallization for high efficiency crystalline silicon solar cells

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The use of plated front contact for metallization of silicon solar cell may alternative technologies as a screen printed and silver paste contact. This technologies should allow the formation of contact with low contact resistivity a high line conductivity and also reduction of shading losses. The better performance of Ni/Cu contacts is attributed to the reduced series resistance due to better contact conductivity of Ni with Si and subsequent electroplating of Cu on Ni. The ability to pattern narrower grid lines for reduced light shading combined with the lower resistance of a metal silicide contact and improved conductivity of plated deposit. This improves the FF as the series resistance is deduced. This is very much requried in the case of low concentrator solar cells in which the series resistance is one of the important and dominant parameter that affect the cell performance. A selective emitter structure with highly dopes regions underneath the metal contacts, is widely known to be one of the most promising high-efficiency solution in solar cell processing. This paper using selective emitter structure technique, fabricated Ni/Cu plating metallization cell with a cell efficiency of 17.19%.

**Key words :** Crystalline silicon solar cells(결정질 실리콘 태양전지), Selective emitter, Nickel(니켈), Copper(구리), High efficiency(고효율)

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