

行政院原子能委員會  
委託研究計畫研究報告

(聚光型太陽電池柵狀接觸電極之優化設計製作與特性量測)  
(Contact grids design, fabrication and devices measurement for  
concentration solar cells)

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## 中文摘要

本研究主要配合核能研究所「新能源技術之發展與應用」計畫中分項計畫「光能發電系統」所需委託執行之子項計畫工作項目，進行聚光型太陽電池柵狀接觸電極之優化設計、電極製作與元件特性量測。

對太陽電池而言，降低串接電阻一直是製程重要的一環，過大的串聯電阻將使得電池的填滿因子降低，進而降低轉換效率，此現象對聚光型太陽電池影響程度更嚴重。因此，如何設計最佳化聚光型太陽電池之柵狀接觸電極，降低太陽電池於高聚光率工作時之串聯電阻，將有助於提昇太陽電池發電模組效率，並增加系統之可靠度。

本研究計畫將建立一套理論模式，模擬分析太陽電池在不同柵狀接觸電極圖形、不同聚光條件下太陽電池之特性參數。此外，將進一步利用透明電極之製作技術，降低電池電極之遮蔽率，增加入射光面積。透過本計畫之執行，將可建構最佳化聚光型太陽電池之柵狀接觸電極之技術，縮短產品開發時程與人力資源。

## **Abstract**

Decrease the series resistance is one of the most important aspects for solar cells. High series resistance will lower the fill factor (FF) of the solar cell, and induce a decrease of transfer efficiency. This phenomenon is even more serious for concentration solar cells. Therefore, optimization of the contact grid design and decreasing the series resistance for the concentration solar cells operated in the condition of concentrated light are particularly helpful to the efficiency enhancement for solar cell module, and increase the system reliability.

This project is to develop a theoretical simulation method to analyze the characteristic parameters of different contact grid patterns and light concentration conditions for solar cells. Furthermore, we will investigate the application of transparent electrode which can lower the shield ratio of the contact metal and increase the exposure area of light. It is expected that this project will benefit the technology development for the optimization of the contact electrode for solar cells. These results are helpful to decrease the duration and human resource of solar cell development.