先進太陽光電材料及技術平台開發計畫(1/2)

執行單位	工業技術研究院	計畫主持人	黃崇傑 技術總監

- 本計畫是以國內太陽光電產業短、中期的發展需求為導向，針對新電池、模組結構、特殊功能材料及關鍵技術三領域提出研發構想，以協助國內太陽光電業者提升競爭力為目標。

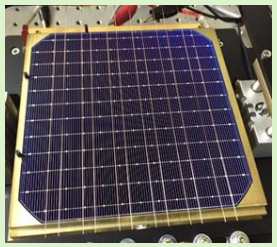
1.太陽光電模組。

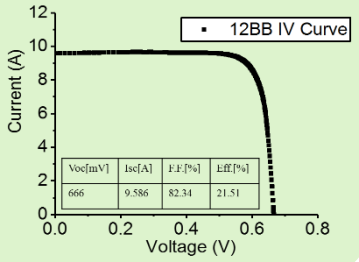
- 中華民國, 申請號106127352
- 中國大陸, 申請號 201710888590.X
- 美國, 申請號15/829,707

2.太陽能光電模組。

- 中華民國, 申請號106124385
- 中國大陸, 申請號 201711029908.5
- 美國, 申請號15/826,002

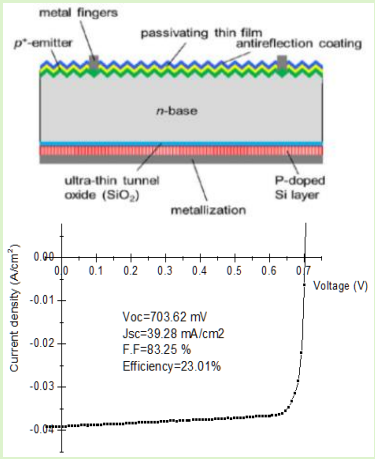
多匯流排太陽電池





染料敏化電池試量產

新異質接面太陽電池



- 高效新結構太陽電池開發：模擬分析匯流排線寬並獲得最佳化圖案設計，以細線化技術與背面鈍化電池整合，使6吋p型單晶背面鈍化太陽電池效率達 21.51%。穿隧型異質接面太陽電池開發，以極薄氧化層及多晶矽摻雜層取代非晶矽層，元件製作效率達23.01%。

- 太陽光電特殊功能材料開發：低溫銅膠材料開發，固化溫度230°C，銅膜電阻率$5.5\times10^{-5}\Omega$-cm，在矽晶太陽電池之抗反射層(SiN)上的附著力最小值為1.3Nt/mm，最佳為2.6Nt/mm。高流動無醋酸封裝材料聚烯烴(Polyolefin)開發，穿透度90.9%，熔融指數39.4(g/10min)，以此材料封裝模組並進行試測驗證，通過IEC 62804-1與IEC61701所規範功率損失≦初始值5%之驗證。

- 太陽光電關鍵技術：染敏電池應用與自動化製程開發，導入電極對位製程技術與染料循環流動式吸附製程技術，電池平均效率達到14.6%，推估室內使用壽命相當於7.4年。與台塑公司簽約合作，共同投入上億元，建置國內第一條染敏電池及模組生產線。

Advanced Photovoltaic Materials and Technology Platform Research Project

Execution Unit	Industrial Technology Research Institute
Project Director	Chorng-Jye Huang, Ph.D, Technical Director

- This PV project is based on the short and medium-term development needs of domestic industries. The developing scopes include new PV cell and module structure, key materials and unique techniques to help industries to enhance their competitiveness.

1. Photovoltaic module。

   Application Number

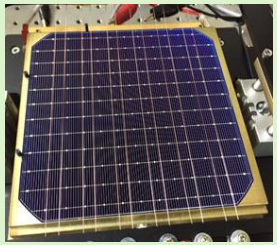
   - TW, 106127352
   - CN, 201710888590.X
   - US, 15/829,707

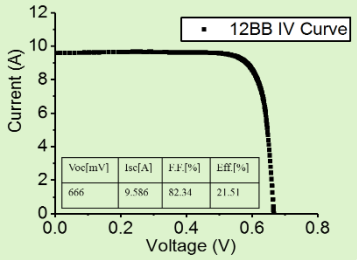
2. Solar photovoltaic module。

   Application Number

   - TW, 106124385
   - CN, 201711029908.5
   - US, 15/826,002

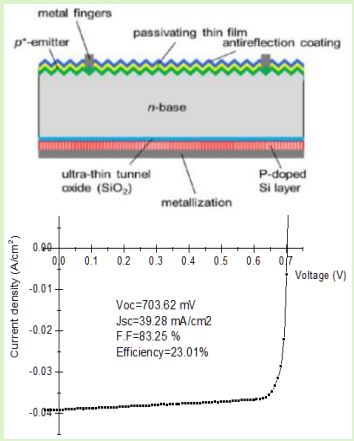
Multi-Busbar Solar Cell





Co-operation of DSC Production

New HJ Solar Cell



- In new structure solar cell development, we used simulation to optimize the multi-busbar electrode for the solar cell design. Combining with the 30μm fine-line finger and advanced surface passivation technique, the efficiency of solar cell is up to 21.51%. For new heterojunction solar cells, we used thin silicon oxide and doped polysilicon for passivation film instead of amorphous silicon film, the efficiency is up to 23.01%.

- In PV function materials research, we developed low-temperature Cu paste that with 230°C curing temperature and $5.5\times10^{-5}\Omega$-cm bulk resistivity. The peeling strength on the SiN surface is between 2.6Nt/mm and 1.3Nt/mm. For new module encapsulation material polyolefin (without acetic composition). We optimized the fluidity properties and improve the transmittance up to 90.9%. The reliability test of module with this material also pass the IEC 62804-1 and IEC61701 standard that the power loss are less than 5%.

- In PV key technology task, we focused on dye-sensitized cell (DSC) production technologies. We developed automation tools including alignment, dye feeding and absorption,etc. Cell efficiency up to 14.6% in average was achieved in this task and cell lifetime is estimated up to 7.4 years. We also signed a big project with Formosa Plastic company for DSC cell production.