

# 超細線寬轉印綠色製程與設備技術開發

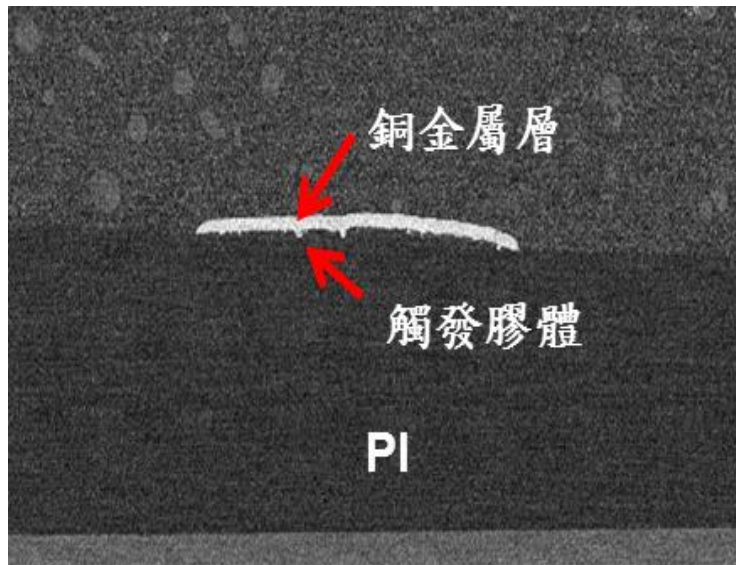
執行單位

工研院機械所

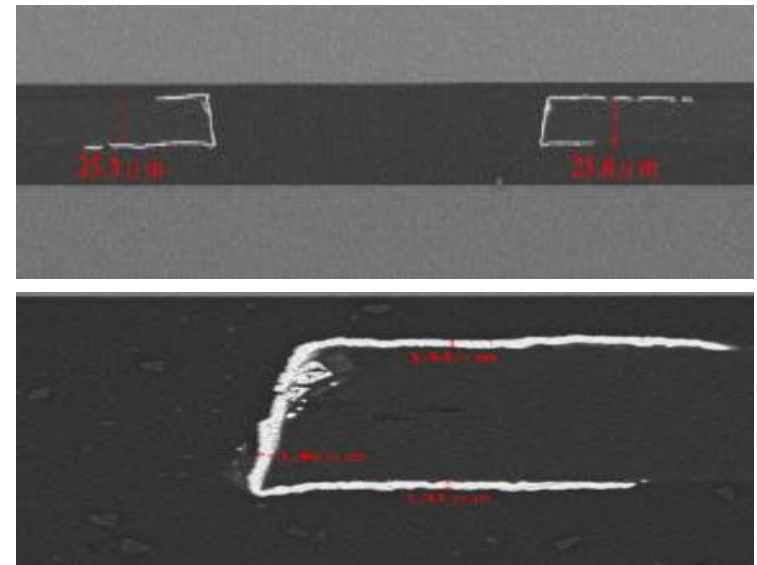
計畫主持人

周大鑫

- 本計畫整合開發細微導線轉印技術之關鍵材料、設備及智能監控回饋系統等，以創新之加成法技術穩定製作線寬 $5\ \mu\text{m}$ 之雙層板，突破現有黃光蝕刻製程之線寬極限( $\sim 30\ \mu\text{m}$ )，並達到節能效益87.7%及材料節省率80.6%，相關技術可用於軟性印刷電路板、天線、觸控元件等光電產品生產，帶動智動化綠色製造風潮。

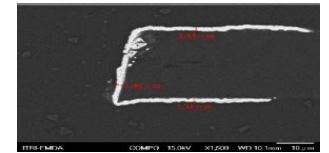
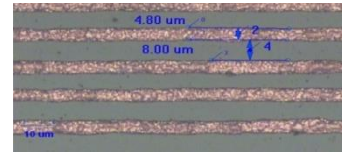
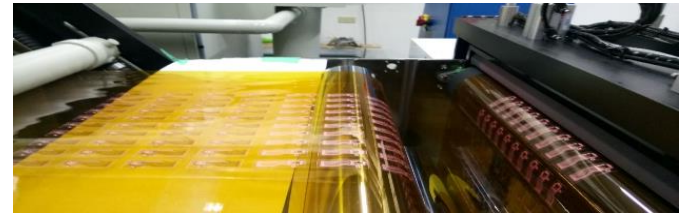
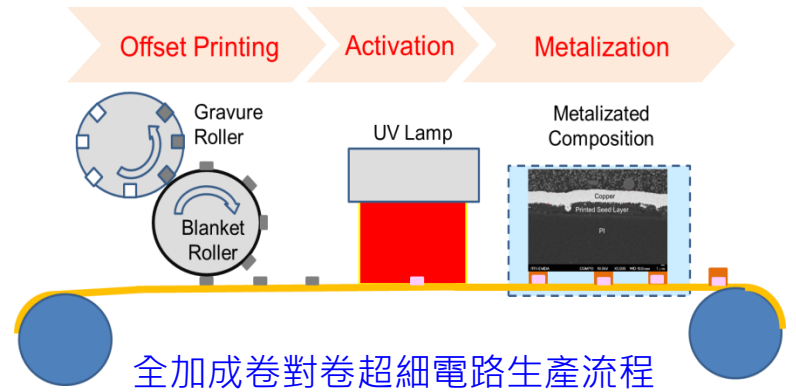


專利-導線結構及其製造方法  
(I584708, US2016157344)



專利-多層線路的製作方法與多層線路結構  
(I574595, US9468095)

整合開發卷對卷轉印設備暨對位系統、雷射加工模具平台、轉印塗料及智能化監控回饋模組等技術，建構高穩定性卷對卷全加成電子電路生產設備，使其經由印刷、活化及金屬化等三道製程，連續生產線寬線距為4  $\mu\text{m}$ /8  $\mu\text{m}$ 之雙層軟板，突破現有黃光製程技術之瓶頸，達到線路細微化(30 $\mu\text{m}$ →<5  $\mu\text{m}$ )、製造綠色化(節能效益87.7%及材料節省率80.6%)及生產智能化之目標。相關研發成果已促成嘉聯益公司完成建構全球首創之「10 $\mu\text{m}$ 線寬全加成軟板製作生產線」，開創至少15億/年產值、技轉黑木公司成立「全台第一家印刷電子代工事業處」，帶動台灣印刷電子產業技術升級及促成與美國康寧、日本郡是及波士頓大學等國際合作案，連結國外先進基板材料，鞏固台灣技術領先地位。



線寬線距=4/8  $\mu\text{m}$ 之通孔雙面軟板



# Non-lithography Green Processing and Equipment Technology Development

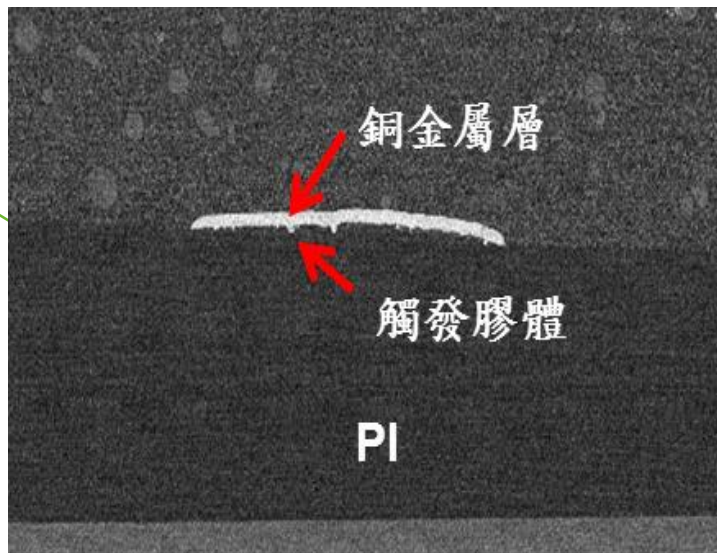
Execution Unit

Industrial Technology Research Institute

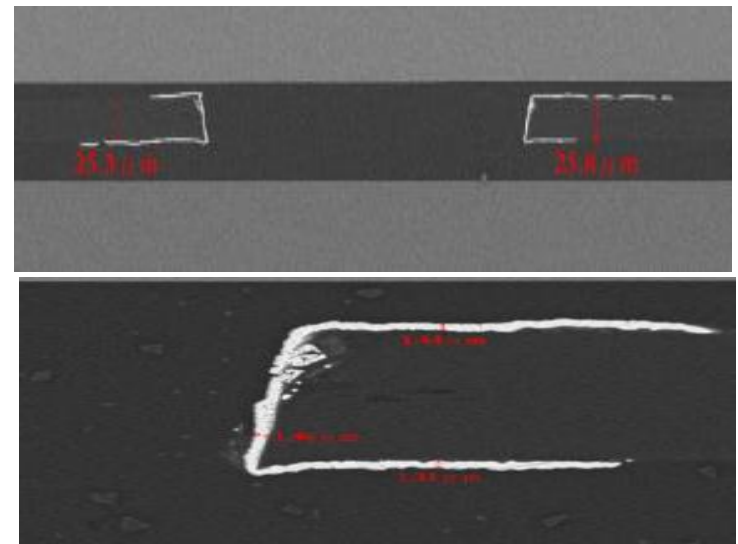
Project Director

Chou, Ta-Hsin

This project has developed a critical materials, equipments, and intelligent monitor and controlling system for equipments to fabricate the double side FPC with 5um linewidth circuits by a innovative green process. This technology breaks through the limitation of lithography processes in the linewidth(~ 30um), and achieve energy saving of 87.7% the materials consumption reduction of 80.6%. The technology can be used for the fabrication of many opto-electronic products, such as FPC, antenna and touch modules etc., and drive the industry into intelligent and green manufacturing.

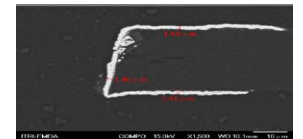
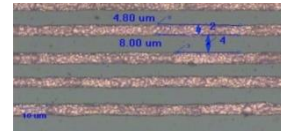
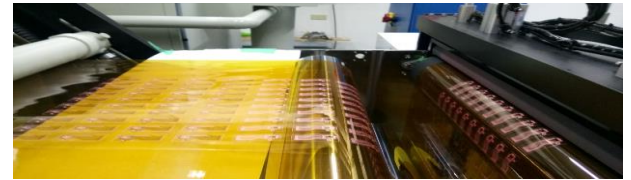
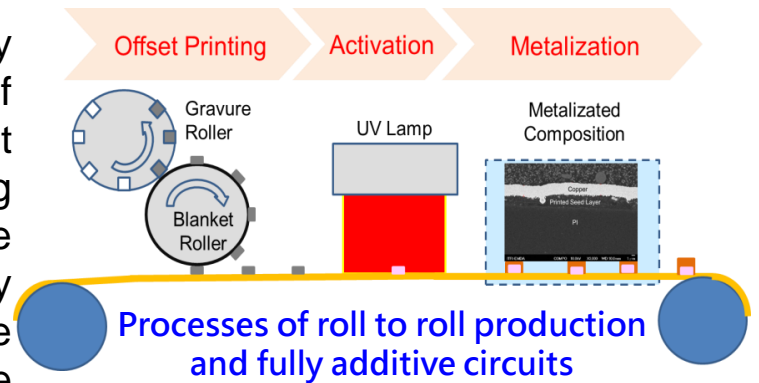


Patent: Structure of conductive lines and method of manufacturing the same. (I584708, US2016157344)



Patent: Manufacturing method of multilayer wiring and multilayer wiring structure. (I574595, US9468095)

This project constructs stable roll to roll production and fully additive circuits equipment by developing technologies of roll to roll gravure offset printing equipment with alignment module, laser machining platform, gravure offset printing ink and intelligent monitor and controlling modules. These technologies break through the limitation of lithography processes and exhibit excellent ability to produce fine line double side FPC (L/S = 4um/8um) continuously with three additive processes (printing, activation and metallization ). The project will achieve the goals of fine line circuits (30μm → <5 μm), green production (reducing 80.6% materials consumption and saving 87.7% energy efficiency) and intelligent manufacturing. The results include building the first fully additive circuits FPC production line (L.W =10um) in the world, and create the value of 1.5 billions NT /year in the future. Technologies transfer to Kuroki company to build the OEM division of printed electronics, and upgrade the technology of printed electronics. This project also promotes international collaborations with Corning (USA), Gunze (Japan) and Boston University to link international advanced materials technologies , then reinforce the technological leadership of Taiwan.



Double side FPC (L/S = 4um/8um)

