

# Simple and Cost Effective Fabrication Process for Making Flexible Transparent Electrodes

## 低成本、簡易的柔性透明電極製備方法

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### Special features 技術特點

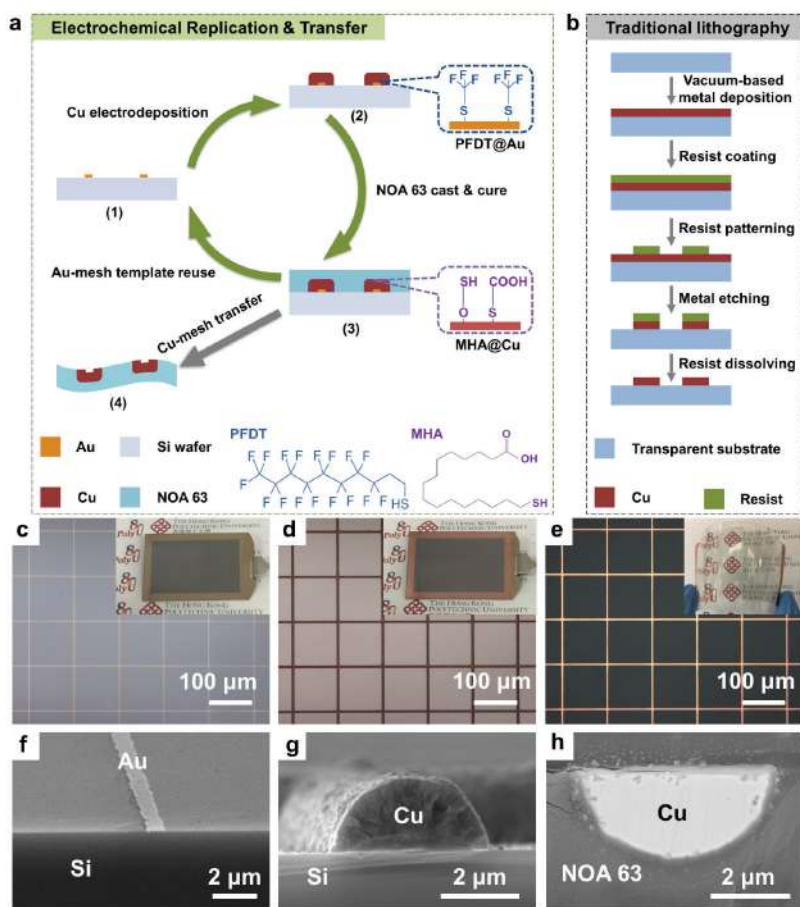
- ▶ Low material and processing cost while maintaining a good performance on scalability, surface smoothness and metal adhesion 成本低，具良好擴展性、表面光滑度和金屬粘附性
- ▶ Avoids complicated lithography or printing steps that will simplify the fabrication of metal mesh 省卻複雜的光刻或印刷製備步驟

Metal mesh is a more preferable kind of transparent electrode materials due to its impressive optoelectronic properties. However, the fabrication process involve complicated and high-cost patterning techniques.

A cost-efficient and facile fabrication process, namely as electrochemical replication and transfer (ERT), is developed to produce the metal mesh-based flexible transparent electrodes (FTEs). The key innovation of ERT method is the adoption of a reusable Au-mesh template to realize high-quality metallic patterns by low-cost solution process. This bottom-up process only consists of two facile steps, where is vacuum free, resist free and etching free. Furthermore, as-made embedded metal mesh-based FTEs show remarkable electro-optical performances. Particularly, the figure of merit soars up to 25,000, which is one new record while compared with previous transparent electrodes.

Considering the cost-efficient, facile and scalable fabrication and excellent properties, we believe our ERT fabrication strategy could effectively promote widely practical application of metal mesh in flexible and wearable optoelectronic devices, such as organic light-emitting diodes, solar cells, touch screen panels, transparent heaters, photodetectors, human-machine interaction apparatus, etc.

理大團隊發明嶄新的電化學複型與轉移技術以取代傳統的光刻技術來製造金屬網格型柔性透明電極。此技術主要的創新點在於使用了可循環使用的金網格模板。製備過程不需要真空條件、抗蝕膠和刻蝕過程，通過廉價及簡易的溶液法來獲得高質量的金屬網格圖案，便可製成光電性能十分優越的柔性透明電極，其品質因數高達25000。此技術可廣泛應用於柔性和可穿戴光電器件，例如有機發光二極管、太陽能電池、觸摸屏、透明加熱器、光探測器、人機交互設備等。



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