

國科會計畫

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捲軸式軟性電子元件技術研究---奈米壓印技術製作軟性薄膜電晶體(II)
Development of Technology for Roll-to-Roll Flexible Electronics---Fabrication
of Flexible OTFTs by Nano Imprint Technology(II)

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中文摘要

本計畫為二年的計畫，目前為第二年，將進行捲軸式奈米壓印技術前期研究，以期未來能應用於軟性電子元件，同時達低成本與良好特性之效果。第一年計畫使用新方法製作 OTFT 元件電極，利用微接觸的方式在金屬表面沾上一層導電聚合物 PEDOT，之後再連金屬一起轉印至有機半導體上，過程中不需要金屬濕蝕刻，不但可解決導電聚合物的導電度問題，也能兼具降低接觸電阻的優點，製作出更穩定且特性良好的 OTFT 元件電極，達最佳化之效果。第二年計畫針對奈米壓印引導有機分子成長的方法進行改良，以製作 OTFT，先對電極的部份進行奈米壓印與蝕刻，形成溝槽後，再進行介電層沉積，形成厚度均勻的介電層，不但具有周期性奈米溝槽圖案引導有機分子成長的優選取向成長，並改善 OTFT 的元件特性的優點，正確估算與控制元件結構，將可有效提升元件的載子移動率與電性，未來若整合捲軸式壓印技術進行量產，將可製作出兼具低成本與良好特性的軟性電子元件。在世界各國皆已投入捲軸式奈米壓印技術之研究的情況下，本研究之獨特性將可發揮最大的研究效益，提升國內此一領域之研究與發展。

關鍵字：奈米壓印技術; 軟性電子元件; 有機電晶體

Abstract

In the two-year project, we will focus on the pilot research and development for the roll to roll nano imprint technology for the future low cost and high performance flexible electronics applications. In the first year, we will work on the new fabrication technique for the OTFTs electrode. With the micro contact inking of PEDOT on metal surface, the two-layer (metal/PEDOT) structure will be transferred to the surface of pentacene. The high conductivity and low contact resistance electrode will be fabricated for the future reliable and high performance OTFTs. In the second year, we will focus on the new technique for the inducement of pentacene molecular orientation of OTFTs by imprint technology. The nano groove for the gate electrode will be fabricated by NIL and reactive ion etching. Then the uniform dielectric layer and the OTFTs will be fabricated. The periodic structure will improve the molecular orientation of pentacene. The prediction and control of the device structure; the mobility and the performance of OTFTs will be also improved. The low cost and high performance flexible electronics will be realized by combined this technique and roll-to-roll technology. The research of our team is unique and can improve the development of related field in our country.

Key words : Nano imprin; Flexible electroncis; OTFTs