可拉伸之電晶體元件

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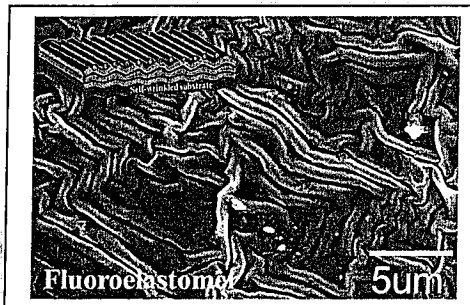
簡　歷： http://140.112.182.188/Professor.html



市場及需求:

穿戴式電子元件及電子人工皮膚等智能元件，需要一具備高效能及良好機械強度的電晶體作為驅動開關， 目前的研究多以預先拉伸的製程應用於無機半導體使電晶體達到拉伸之特性，然而此製程無法應用於連續式生產使得整體成本高昂，本發明結合有機電晶體技術及含氟彈性體基材，成功開發出一可連續製程之拉伸電晶體，於未來穿戴式電子元件的市場具備關鍵角色。

技術摘要(含成果):

本發明係關於一種可拉伸電晶體元件，其中包含一表面之皺褶之含氟彈性體(fluoroelastomer)做為基材，此外，亦可更進一步包含該表面皺褶之含氟彈性體做為一介電層，本發明由於使用具有自交聯之表面皺褶之含氟彈性體做為基材及介電層，顯著增加可拉伸場效電晶體的機械柔量。除此之外，該可拉伸之電晶體晶2000次30%之同軸向拉伸循環後，仍具有高度且穩定的遷移率表現。

優勢:

本發明乃是利用交聯技術產生一表面具備皺褶之含氟彈性，並藉此提高元件的拉伸特性，此方法成本較低，且後續半導體及電極的塗層皆不需在預先拉伸基板的狀況下完成，因此可應用於連續式生產。

競爭產品:

目前穿戴式電子元件產品，多只具備可饒曲性，無法提供拉伸性，因此無法有效貼合於皮膚上，進一步取得更多人體的訊息，本發明可大幅改善穿戴式電子元件的應用範圍，使產品更具備市場競爭性。

專利現況:

本團隊於高效能有機電晶體的開發已有數十年之經驗，本次結合有機電晶體及表面皺褶之含氟彈性體應用於拉伸電晶體乃是國內首創之專利。

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Stretchable Transistor

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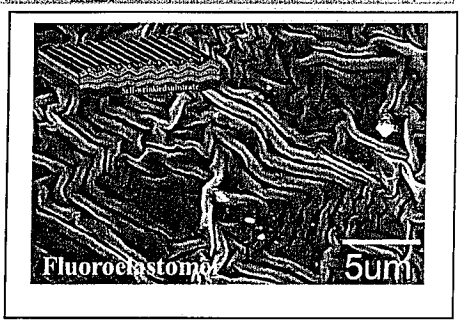

Market Needs:

Field effect transistors are crucial components for wearable devices or electronic skin applications, and they need to be durable enough under a high level of strain without any significant degradation of the electrical properties. In the recent researches, the stretchability of transistor devices was achieved by the prestrained method. However, this method could not be integrated to the continuous process or roll-to-roll fabrication, leading to high cost. We developed an organic transistor based on fluoroelastomer substrate with self-wrinkled surface to have well mechanical property, which is a low-cost, facile manufacturing method for the future wearable devices applications.

Our Technology:

The present invention relates to a stretchable transistor, comprising a fluoroelastomer with a self-wrinkling surface as the substrate as well as the dielectric layer. The present invention provides a strategy to significantly enhance the mechanical compliance of intrinsically stretchable FETs using a fluoroelastomer with a crosslinking-induced self-wrinkling surface as the substrate as well as the dielectric layer. Besides, the high electrical performance of the device was stable over 2000 cycles of stretching under 30% uniaxial strain.

Strength:

In the present invention, the stretchability of the transistor was not achieved through the pre-strained or bucking method. The semiconductive layer and electrode could be deposited on the fluoroelastomer substrate directly. This method could be integrated to continuous process to reduce the cost of the manufacture.

Competing Products:

Recent products of wearable devices only possess flexibility, so they cannot attach the human skin well to collect more information from the body. The present invention could enhance the stretchability of the wearable devices to enlarge the applying scope of the devices.

Intellectual Properties:

Our group have made efforts to the development of high performance organic transistor for many years. The present invention combine the organic transistor and fluoroelastomer with self-wrinkled structure to fabricate the stretchable transistor is a novel technology. To our best knowledge, the present invention is first time to be reported.

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