


鋁氧化物對三(8-羥基喹啉)鋁有機雙穩態記憶 體元件特性的影響

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摘要



在本篇論文當中，我們結合了 OLED 與有機雙穩態記憶體。主要的元件結構為在 ITO 玻璃基板跟鋁電極中，嵌入一層有機發光材料 Alq₃，此元件具有發光和雙穩態的兩種特性；之後製作另一種結構的元件，在有機材料層中嵌入一層鋁金屬層。比較了兩種結構的電性之後，我們得到當有機材料層中嵌入一層鋁金屬層時，有機記憶體元件會有較佳的電性，例如：臨界電壓、ON/OFF 電流比、保留時間。但是卻遇到了問題：有機記憶體元件寫入訊號後卻無法抹除。我們推斷是因為 ITO 玻璃基板粗糙度影響了中間鋁金屬層的覆蓋性所造成。

因為 ITO 玻璃基板表面粗糙度會影響中間鋁金屬層的覆蓋性，在之後的篇章中，為了改善這個問題，我們用金取代 ITO 為下電極，並且增加中間金屬層的厚度。由於中間鋁金屬層的成分會影響有機雙穩態的特性，我們利用打氧電漿的方式讓中間金屬層形成鋁氧化物，成功的解決了有機雙穩態記憶體元件不易抹除的問題。之後，我們更改變了中間鋁金屬層的厚度跟打氧電漿的時間，並且討論對有機雙穩態特性的影響。

Study on the effect of Al-oxide complex on the performance of Alq₃-based organic bistable memory device

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Abstract

In this work, we fabricate an organic electrical bistable device (OBD) that combines with organic light emitting diodes. We report an organic bistable memory made of single organic layer embedded the ITO-structure and the Al electrode. And, we also fabricate the same device that interposes the inner metal film, Al. We compare with two kinds of OBDs. Then, the inner metal film that is interposed at organic layer improves the characteristic of electrical bistable effect, such as threshold voltage, on/off current ration, retention time. There is a problem that the OBDs doesn't erase information after processing. We think that roughness of ITO-substrate affects the coverage of inner metal film.

Later, we change the bottom ITO-glass electrode by Au and increase the thickness of inner metal film in order to improve the coverage of inner metal film. The method of inner metal film is treated with oxygen-plasma in order to form Al-O complex. And, there are several thickness of the inner metal layer is treated with oxygen-plasma for different time to discuss the characteristic of electrical bistable effect. Moreover, we are able to modify the electrical bistable properties by utilizing appropriate thickness of oxide layer and oxygen-plasma time.

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