可撓式塑膠基板低溫成長銦錫氧化物薄膜特性之研究

陳瀅照、王立民

E-mail: 9420021@mail.dyu.edu.tw

摘 要

本研究主要是探討以DC磁控濺鍍法分別於康寧玻璃基板Corning 1737F和PES光學級可撓式塑膠基板上鍍覆透明導電ITO薄膜，研究探討低溫下製程ITO薄膜之其結構與光電特性之關係，以獲得最佳之成長條件。我們利用X-ray繞射儀來鑑定ITO薄膜之磊晶方向；使用原子力顯微鏡來觀察其表面形貌與平整度；以及掃描式電子顯微鏡來觀察其薄膜/基座之界面型態。另外，我們量測其電阻率、霍爾效應以及光穿透率，來鑑定其光電特性。 我們發現利用X-ray繞射儀來鑑定ITO薄膜之磊晶方向，ITO薄膜具有(222)、(400)以及(440)之磊晶成長方向，另外，在相同的操作條件，隨著I(222)強度越強，所得到ITO薄膜之電阻率越低。研究結果顯示，我們獲得最佳之製程條件為DC功率300 W，工作壓力在2 mtorr，工作溫度為室溫，Ar和O2的比例為100：1。在此製程條件之下其中以康寧玻璃為基座：電阻率約為6.61X10-4 Ω cm，載子濃度為2.31X1020 cm-3，在可見光範圍之穿透率可以達88 %；以PES光學級塑膠為基座：電阻率約為6.42X10-3 Ω cm，載子濃度為1.13X1019 cm-3，在可見光範圍之穿透率可以達85 %。此結果與目前文獻之最佳條件值相較，顯現我們的ITO薄膜有更好或相近之光電特性，此結果亦顯示，利用DC磁控濺鍍方式在室溫成長ITO薄膜，在本研究獲得之最佳成長參數之條件下，無論在玻璃基板或PES塑膠基板上，我們均可獲得光電特性相當良好之ITO薄膜。

關鍵詞 : DC磁控濺鍍、PES、可撓式、ITO

目錄

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