

出國報告(出國類別:參加國際會議)

參與第五屆國際表面電漿光子研討
會-發表及學術交流
(The 5th International Conference on
Surface Plasmon Photonics)

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出國期間：5/15-5/20

報告日期：5/16

摘要

榮幸獲得第五屆國際表面電漿光子研討會的認可，得以赴韓國釜山參與發表論文，於 2011 年 5 月 15 日出發至韓國釜山，為期六天的研討會議程，在 5 月 16 日以海報的方式發表我的研究，過程中有非常多國外的學者詢問及意見的交流，在交流過程中除了練習英文能力外，更能對自己的研究有新的看法及見解。此外也瀏覽了很多國外學者發表的研究，有問題時也積極的請教。會議中有許多演講，而演講者都是在此學術領域中有所貢獻，聆聽後受益良多。會場規模之大，讓我見識到國際研討會的氣度，除了內容程度高外，連食住行皆幫你想的週到，讓從國外來的學生，不至於手忙腳亂。期間利用空餘時間順道觀光釜山風光，調解研究時的壓力。整個過程下來收穫非常多，也很感謝高雄應用科技大學國際合作組在經費上的幫助。

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一.目的

參加國際性研討會有助於學術及研究上的知識增長，而這次韓國釜山所舉辦的第五屆國際表面電漿光子研討會(The 5th International Conference on Surface Plasmon Photonics)在學術上的地位深重，所邀請的演講者更是赫赫有名，參加其研討會勢必會有所成長，而學生在碩士班所研究的題目是運用表面電漿效應增強光電特性在 AZO/Pt/AZO 薄膜結構(The Enhanced Optoelectronic Characterization on AZO/Pt/AZO Thin Films By The Surface Plasmon Effect)，與此研討會之主旨相關，因此藉此機會投稿，期望在研討會上能與其他國外學者交流，藉此吸收經驗及知識。

二.過程

2011 年 5 月 15 日前往韓國釜山，研討會地點在國際會展中心(BEXCO)，會議中心規模非常大，會議為期六天(5/15-5/20)，其中我的報告日為 5 月 16 日，以海報的形式呈現，報告日當天非常多其他學者共同參與報告，許多學者也會來與我討論研究的過程與結論，皆是以英文來做交流，雖然英文能力雖非頂好，但應達上皆得以，國外學者接非常有禮貌，在研究上也會給些建議，讓我收穫非常多，海報展出時間為晚上六點至九點，顧大會非常貼心的準備了豐富的晚宴，提供給在場學者享用，菜色非常豐富，也見識到國際會議的規模。

除了報告時間以外，我也聆聽了許多學者的報告及演講，同時也見識到國外研究很進步，分析上也非常扎實，有結構上的特殊變化、奈米點及線的電磁場分析及理論分析，好多是我要去學習及檢討的地方，其中也看到很多台灣過去發表的學生，有台灣大學、清華大學、中央大學及義守大學等等，也都是非常的傑出，在問問題的過程中，如果遇到印度或法國的話，他們的英文音調非常難以適應，但我也是盡力的聽取關鍵字去詢問即回答，過程也是讓我英文能力有所成長。

研討會為期六天，議程非常的多，期間有一天是無議程日，大會希望我們可以藉此多多參觀釜山風光，多多消費，因此就去釜山西面及南浦洞，逛街觀光一下，韓國釜山地鐵非常便利，幾乎所有景點皆可以到達。韓國人非常熱心，問路時體驗非常深。

三.心得及建議

這是我第一次出國參與國際性研討會，是一個非常難得的經驗，也感謝指導教授讓我有機會出國參與，參與國際性研討會對於研究生來說是非常不容易的事，因為需要有一定的研究成果及勇氣，勇氣是去面對國外的環境及面對國外學者的提問，這對我未來繼續求學之路極有幫助。這次會議也得到了許多研究上的資訊及知識，希望下次能有再一次的機會參予別的國際研討會。特別感謝高雄應用科技大學國際合作組給予我在經費上的補助，非常感謝。

這次參與國際研討會見識到了很多高深的研究及許多專業的研究態度，在科技的領域上即使沒有高級的設備，也要秉持專業的研究態度，這點讓我體驗很深。同時也見識到國際會議的規模及氣度，國內的研討會也往往受限於經費上的不足而有所縮減，希望在台灣也能見識到氣度非凡的國際性研討會。

四.附錄

研討會接受邀請函

Acceptance Letter

Dear Po-Wei Chen,

We are very glad to inform you that your abstract (**The Enhanced Optoelectronic Characterization on AZO/Pt/AZO Thin Films By The Surface Plasmon Effect**) has been accepted for poster (contributed) presentation in SPP5. We will soon inform you of the finalized program and the detailed schedule. We are looking forward to seeing you in Busan !

Sincerely,

SPP5 Secretariat

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The Enhanced Optoelectronic Characterization on AZO/Pt/AZO Thin Films By The Surface Plasmon Effect

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NDL99-C02M3-085

Abstract --- Transparent Conducting Oxide (TCO) has been widely used for photoelectric devices such as liquid crystal displays (LCDs), light emitting diodes (LEDs) and thin-film solar cells [1]. The TCO thin film can be applied in the visible range (about 400nm ~ 800nm) with a higher transmittance than 80% and a less resistivity than $10^{-3}\Omega\text{-cm}$ [2]. The metal Pt had been designed as the structure AZO/Pt/AZO to enhance the conductivity of original AZO thin film, the metal Pt was chosen due to the lower resistivity, chemical stability and higher reducibility. The structure of dielectric/metal/dielectric (D/M/D) has surface plasmon effect, which will enhance the optical transmittance and conductivity [3]. The rapid thermal annealing (RTA) had been used to reconstruct thin film structures and release the inner strain energy in AZO/Pt/AZO thin films. In this study, the AZO/Pt/AZO thin films had been deposited by RF magnetron sputtering with various Pt thicknesses from 0.8nm to 5nm at room temperature. The effects of various Pt thicknesses and the post-annealing temperature on the microstructure were investigated. The microstructure and thicknesses of the films were obtained by Field Emission Scanning Electron Microscopy (FE-SEM). The crystal orientation was identified by X-ray diffraction (XRD). The resistivity and transmittance of the films were measured by four point probe and optical measurement, respectively. As shown in Fig.1(a) it could be observed the nanostructure of AZO/Pt/AZO thin film. In Fig.1(b), the AZO/Pt thin film became denser and the thickness of films reduced with the increasing annealing temperature, due to the inner defect and vacancies were reconstruction and release. The crystal orientations of AZO/Pt/AZO was at (002) and (103) plane of ZnO, (111) plane of Pt and (200) plane of Al by XRD spectrum. As shown in Fig.2(a), it could be observed that resistivity decreased with increased the annealing temperature. The AZO/Pt(5nm)/AZO has the lowest resistivity of $1.414 \times 10^{-3}\Omega\text{-cm}$ at the annealing temperature of 700°C, due to uniformly Pt segregation into AZO films. In Fig. 2(b), the average optical transmittance was up to 80% at the annealing temperature of 500°C. The AZO/Pt(5nm)/AZO has the highest average transmittance of 84% at the annealing temperature of 500°C, due to the

distribution of Pt become more uniform and the surface plasmon effect was observed obviously which decreased the light scattering.

Keywords: AZO thin films, RF magnetron sputter, resistivity, segregate, surface plasma effect

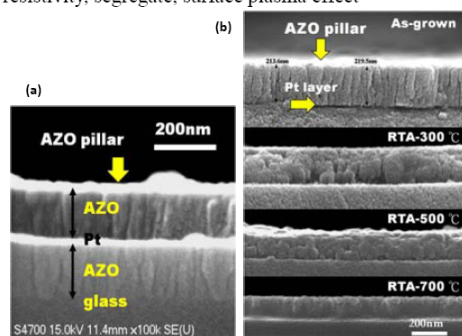


Fig.1 The FE-SEM cross-section image of (a) the AZO/Pt/AZO thin film under as-grown and (b) the AZO/Pt layer with various annealing temperature.

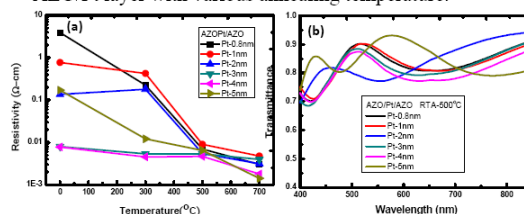


Fig.2 The relation between (a) the resistivity and (b) the transmittance with various annealing temperatures for AZO/Pt/AZO thin films

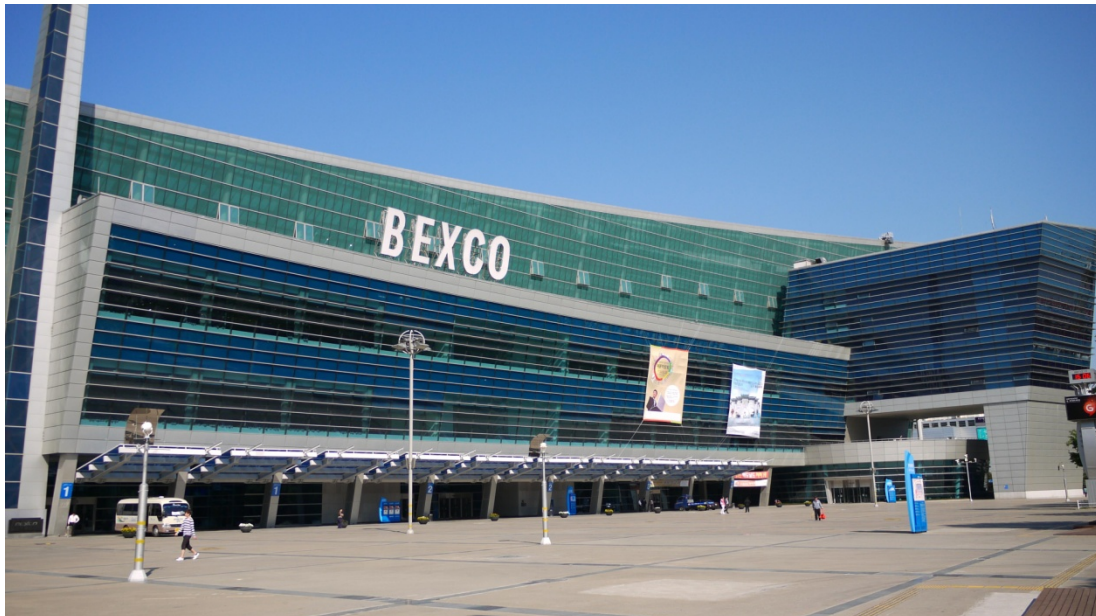
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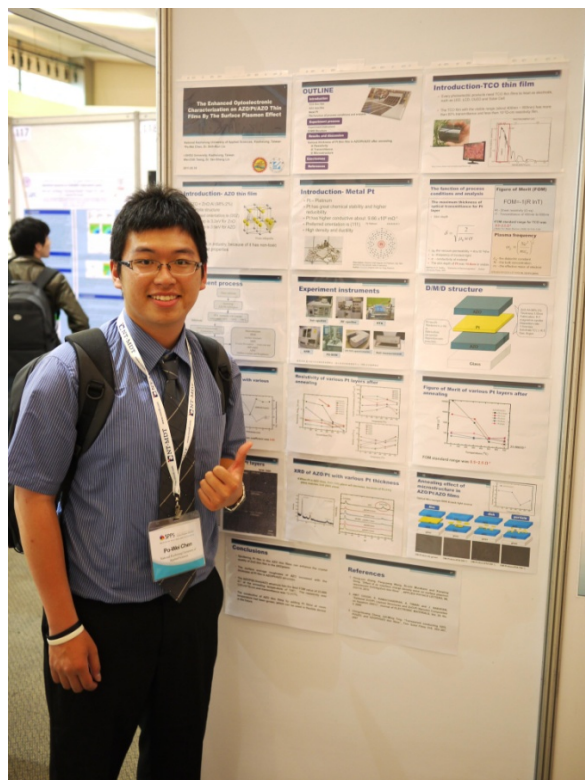
韓國釜山國際表面電漿光子研討會門口一景



韓國釜山國際會議中心(BEXCO)



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與國外學者學術交流

