This study divided into two parts, the first part to look at a variety of (LiI, NaI, KI) and Propylene carbonate (PC) the composition of the electrolyte system to AC impedance method (AC Impedance), etc. Characteristics of electrochemical; as a dye-sensitized solar cells (Dye-Sensitized Solar Cell, DSSC) electrolyte systems, measurement of its Photoelectric conversion efficiency on a variety of electrolyte systems for the photovoltaic characteristics of the impact of components. The second part of this study was primarily aimed at the working electrode, in order to spin a good TiO2 coating solution will be allocated to the ITO coated glass as working electrode after sintering, and with different thickness, to observe the heterogeneous structure of the photoelectric conversion efficiency. Electrolytes are EKM-034 (0.34 M KI +0.01 M I2 in PC), ENM-034 (0.34 M NaI +0.01 M I2 in PC), ELM-034 (0.34 M LiI +0.01 M I2 in PC) to observe the performance of its IV. The results showed that TiO2 film with the working electrode is directly proportional to the number of spin-coating, and when the working electrode thickness reached at 9.1μm (six), with the best of the photoelectric conversion efficiency, when it increased again when the electrode thickness, light no further increase in power conversion efficiency, but slightly short-circuit current. Based on the above conclusions, the best known of these study process parameters: TiO2 layer six, electrolyte is ELM-034, may be the largest photovoltaic conversion efficiency, η = 6.33 %, PV test results are: VOC = 0.730 V, JSC = 15.36 mA, FF = 56.46 %. Heterogeneous structure can further upgrade photovoltaic conversion efficiency, The structure of ITO / P25-TiO2 (6L) / CNT, PV test results are as follows; VOC = 0.690 V, JSC = 18.44 mA, FF = 53.60 %, η = 6.82 %; the structure of ITO / Sol-Gel TiO2 (3L) / P25-TiO2 (6L) / CNT, PV test results are as follows; VOC = 0.657 V, JSC = 18.06 mA, FF = 55.26 %, η = 6.56 %; the structure of ITO / SnO2 / Sol-Gel TiO2 (3L) / P25-TiO2 (6L) / CNT, PV test results are as follows; VOC = 0.663 V, JSC = 19.15 mA, FF = 55.40 %, η = 7.03 %. It can be seen: The carbon nanotube-modified working electrode of titanium dioxide, contribute to dye-sensitized solar photovoltaic conversion efficiency. AC Impedance analysis and PV measurement shows: PC solvent system, electrolyte Composition its size LiI > NaI > KI.
儀實驗方法 ........................................................41

3.4 實驗方法 ........................................................42

3.4.1 實驗流程 ......................................................42

3.4.2 氧化銦錫玻璃(ITO)基板之清洗 .....................................44

3.4.3 電解液配置 .....................................................45

3.4.4 染料配製 ......................................................46

3.4.5 鍍膜液之製作 ...................................................46

3.4.6 工作電極之製作 .................................................48

3.4.7 Pt對電極製作 ...................................................49

第四章 結果與討論 ....................................................51

4.1 工作電極製備SEM之膜厚分析 .........................................51

4.2 UV/VIS分析 ......................................................54

4.2.1 D719染料於D.I Water溶劑分析................................54

4.3 光電量測部份 ......................................................56

4.3.1 PEG分子量於TiO2之影響..........................................56

4.3.2 電解質組成對光伏特性之影響:不同濃度影響..........................57

4.3.3 工作電極的膜厚對光伏特性之影響...................................59

4.3.4 電解質組成對光伏特性之影響:陽離子的影響..........................60

4.3.5 添加奈米碳管比例對光伏特性之影響.................................61

4.4 新穎電極結構 .....................................................64

4.4.1 SG-TiO2工作電極的層數對光伏特性之影響............................64

4.4.2 階層結構工作電極對光伏特性之影響.................................66

4.4.3 奈米碳管修式P25-TiO2對光伏特性之影響.............................69

4.4.4 奈米碳管修式SG-TiO2對光伏特性之影響..............................70

4.4.5 添加奈米碳管修式SnO2對光伏特性之影響..............................72

4.5 電化學-交流阻抗分析 ...............................................73

4.5.1 工作電極的膜厚之交流阻抗分析.....................................73

4.5.2 電解質組成之交流阻抗分析:陽離子的影響............................75

4.5.3 奈米碳管修式P25-TiO2之交流阻抗分析...............................76

4.5.4 奈米碳管修式SG-TiO2之交流阻抗分析................................77

4.5.5 添加奈米碳管修式SnO2之交流阻抗分析.................................78

第五章 結論 ..........................................................80

參考文獻 ............................................................82

REFERENCES


[14] 劉茂煌,奈米光電池,工業材料雜誌203期,P93.


[18] 童永樑,釕金屬染料在染料敏化太陽電池的演進,工業材料雜誌255期,P110.


[32] 莊嘉琛 "太陽能工程 太陽能電池篇" 全華, 台北市, 第一章、第二章、第四章, 民96


[35] 東華大學電子工程研究所碩士論文 "二氧化鈦工作電極的結構對於染料敏化太陽能電池的表現之影響" 李明福 2009

