

化學水浴法製備氧化鋅膜之性質研究

The Characterization of Zinc Oxide Film Prepared by Chemical Bath Deposition Method

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摘 要

本研究以化學水浴沉積法 (Chemical bath deposition, CBD) 製備氧化鋅薄膜，尋找適合做為薄膜型太陽能電池應用的導電層。利用硝酸鋅作為鋅之來源，加入不同比例氨水溶液均勻混合後，於 80°C 反應溶液中水浴沉積生長氧化鋅薄膜，再以 500°C 進行熱處理 1 小時。本研究根據氨水濃度和沉積時間的不同作為變更參數。將熱處理後的試片以 X 光繞射光譜儀 (XRD) 分析得到其薄膜結構為六方體 (Hexagonal) 結構。掃描式電子顯微鏡 (SEM) 觀測表面形貌，薄膜底層為異質成核的界面，隨著沉積時間增加會有部分均質成核的氧化鋅顆粒吸附；根據紫外光/可見光 (UV/Vis) 吸收光譜儀量測穿透率，再藉由穿透率與入射波長的關係，換算得到其能隙 (Eg) 約為 3.0~3.2 eV；利用螢光光譜的分析，測得氧化鋅薄膜在 510nm 和 570nm 波長位置會有發散光產生。歸納以上分析之結果，在氨水濃度為 0.05M 且沉積時間為 120 分鐘的條件下所得到的氧化鋅薄膜，較適合應用於薄膜型太陽能電池。

關鍵詞：化學水浴沉積、氧化鋅、薄膜太陽能電池。

Abstract

In this study, chemical bath deposition (CBD) was used to prepare ZnO films. These thin films are looking forward to application in thin film solar cell as the conductive layer. ZnO thin films were prepared by CBD using zinc nitrate as starting materials. The zinc nitrate was dissolved in distilled water and then added to a solution of ammonia and heated at 80°C to grow zinc oxide film on glass substrate. Then these glass substrates were heat-treated at 500°C for 1 h. In this study, the experimental parameters are ammonia concentration and deposition times. The ZnO structure was analyzed by X-ray diffraction spectrometer (XRD) and found that it is a Hexagonal structure prepared by CBD. According to Scanning electron microscopy (SEM) observation, it was found that the bottom of the interface is heterogeneous nucleation. With the increase in the deposition time, there was a homogeneous nucleation on zinc oxide thin film surface. The UV/visible light (UV/Vis) absorption spectrometer was used to measured the energy gap (Eg) and

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