

行政院原子能委員會
委託研究計畫研究報告

光電化學太陽電池固態化電解質研究

The solid electrolytes for solar cell

計畫編號： 952001INER 033

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報告日期： 95 年 11 月 21 日

中文摘要

本計畫的主要目的是尋求 DSSC 太陽能電池用之固態或類固態的電解質。我們用兩個研究方向來找尋：第一是合成分具平面結構之有機共軛分子如 DODCP 等以做為真固態電洞傳遞層(電解質);第二種是合成含小孔洞之高孔隙度高分子分載體(如 PVDF-HFP 與其他高分子之混摻物)以做為液態電解質得吸附體的類固態電解質。實驗結果顯示以平面有機共軛分子做電洞傳遞層時的 DSSC 效率非常低,可能是 DODCP 的載子移動率(mobility)太小之故。而適當的將 PVDF-HFP 與其他高分子如 F108 混摻再經特殊加工方法所製備之高分子載體在吸附電解質溶液後之離子導電度約為液態電解液的 1/4, 使用 PVDF-HFP 類固態電解質之 DSSC 的效率為使用液態電解液的 90%, 而且穩定度也較好。

Abstract

The objective of this proposal is to search for high conducting solid or pseudo-solid electrolytes for Dye Sensitized Solar Cells (DSSCs). We use two approaches to prepare solid electrolyte. One is to prepare small conjugated molecules or ordered conjugated oligomer (such as DODCP and its derivatives) as a true solid hole transport media (electrolyte). The other way is preparing PVdF-HFP based porous polymer as the substrate of the electrolyte solution (pseudo-solid electrolyte). The results showed that DSSC using DODCP as hole transport layer has very low conversion efficiency, probably due to the low charge mobility of the DODCP molecule. On the other hand, the ionic conductivity of PVdF-HFP based polymer electrolyte is similar to that of commercial liquid electrolyte. The photo conversion efficiency of DSSC using PVdF-HFP based polymer electrolyte is ~ 70% of the DSSC using liquid electrolyte, nevertheless, DSSC used PVdF-HFP based polymer electrolyte has a much higher stability.