

나노기공을 갖는 CaCO_3 가 코팅된 TiO_2 광전극 제조와 염료감응형 태양전지로의 응용

정 현석¹⁾, 이 상욱²⁾, 홍 국선³⁾

Preparation of Nanoporous CaCO_3 -coated TiO_2 Electrode and Its Application to a Dye-sensitized Solar Cell

Hyun Suk Jung, Sangwook Lee, Kug Sun Hong

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Abstract : A nanoporous CaCO_3 overlayer-coated TiO_2 film was prepared by the topotactic thermal decomposition of $\text{Ca}(\text{OH})_2$, and its performance as an electrode of a dye-sensitized solar cell was investigated. As compared to bare TiO_2 , nanoporous CaCO_3 -coated TiO_2 provided higher specific surface area, and subsequently a larger amount of dye adsorption; this in turn increased short circuit current (J_{sc}). Furthermore, the CaCO_3 coating demonstrated increased impedance at the TiO_2 /dye/electrolyte interface and increased lifetime of the photoelectrons, indicating the improved retardation of the back electron transfer which increases J_{sc} , open circuit voltage (V_{oc}) and fill factor (ff). Thereby, higher energy conversion efficiency of the solar cell improved from 7.8% to 9.7% (the improvement of 24.4 %) as the nanoporous CaCO_3 coating was applied to TiO_2 .

1) 국민대학교 신소재공학부
E-mail : hjung@kookmin.ac.kr
Tel : (02)910-4817 Fax : (02)910-4320
2) 서울대학교 재료공학부
E-mail : uriwoogy@hotmail.com
3) 서울대학교 재료공학부
E-mail : kshongss@plaza.snu.ac.kr