

향상된 기능성을 갖는 고분자 필름 제작 및 태양전지에의 응용

한강수, 이 현[†]

고려대학교 신소재공학과
(heonlee@korea.ac.kr[†])

태양전지의 효율 상상을 위한 한 가지 방법으로써 태양전지 보호층으로 사용되는 폴리머에 저반사 효과를 갖는 나노급 패턴을 형성하였다. 실험에 사용된 폴리머 필름으로는 열가소성 수지인 PMMA(polymethyl methacrylate) 및 PVC(polyvinyl chloride)등이 사용되었으며, 이는 핫엠포싱 과정에서의 우수한 성형성과 높은 광투과율을 고려한 선택이었다. 폴리머 기판에 나노급 패턴을 형성하기 위해서 핫엠포싱 방법이 사용되었으며, 이것은 각각의 폴리머 기판의 T_g 이상에서 수행되었다. 핫엠포싱 과정을 거친 폴리머 기판은 실온까지 냉각 후 마스터 몰드로부터 분리되었으며, 폴리머 기판의 표면 관찰결과 마스터 몰드의 역상의 패턴이 잘 전사된 것을 확인 할 수 있었다. 나노급 패턴이 형성된 폴리머기판은 광 투과율이 향상되었으며, 이를 태양전지의 보호층으로 사용함으로써 태양전지의 모듈화 과정에서의 손실을 최소화 하고자 하였다.

Keywords: 엠포싱, 모스아이, 태양전지

High-Photoconductive Characteristics of CdS and PbS Thin Films Grown by Chemical Bath Deposition

Challa Kiran Kumar, Nguyen Thi Quynh Hoa, Seung-Hee Kang,
Soon-Gil Yoon, Eui-Tae Kim[†], Geun Hong Kim^{*}

Department of Materials Engineering, Chungnam National University, Daejeon, 305-764, Korea;

^{*}Agency of Defense Development
(etkim@cnu.ac.kr[†])

Cadmium sulphide (CdS) thin films have received a growing interest in these days due to their electro-optical properties that are suitable for applications in the field of optoelectronic devices, particularly solar cells and photo detectors and it is one of the most sensitive photoconductors in the visible light regime. A wide range of world wide research work is going on CdS to use in stealth radome applications for defense purpose. As CdS is a good photoconductor it can act as an insulator for the transmit signal and acts as a metallic material for the block signal. Although high-quality CdS can be produced by metalorganic chemical vapor deposition or molecular beam epitaxy, the fabrication cost increases significantly. Chemical bath deposition (CBD) is an alternative approach to synthesize high-quality polycrystalline CdS thin films on large-scale wafers including flexible substrates at a low cost. In this study, polycrystalline CdS thin films were successfully deposited by CBD method on various substrates such as glass and Si. The CdS thin films were grown at low molar concentration of sulfur solutions i.e. 1:0.125 for getting high conductivity and studied the variation in the photo, dark sheet resistance and photosensitivity values by changing the NH_3 volume. The thin films prepared from low molar concentrations of sulfur (S) and at the growth temperature of 80 °C have shown low sheet resistance values due to the presence of more S vacancies. It was observed that not only the concentration ratio of 'Cd' and 'S', but also the concentrations of NH_3 and TEA played an important role to determine the photoconductive characteristics of CdS films. It also studied that the CdS thin films grown at equal molarities of 'Cd' and 'S' solutions, but with lower volumes of 'S' than 'Cd' solutions give very low photo sheet resistance of $2.5 \times 10^3 \Omega/\square$ with high photosensitivity of 5×10^9 . Research work is also proceeding with different compositions of $Cd_{1-x}Pb_xS$ and $CdS_{1-x}Se_x$ thin films. We will further discuss the growth mechanism and photoconductive characteristics of CdS films and its various doping compositions with Pb and Se by CBD.

Keywords: CdS Thin Films, High Photoconductive films, CBD, (Cd&Pb)S thin films