

EW-P017

flexible electric device를 위한 flexible insulator

김동원¹, 김민규², 이정훈¹, 유지범^{1,2,*}

¹성균관대학교 공과대학 신소재공학부, ²성균관대학교 나노과학기술협동과정

현대 반도체 산업에서 소자의 집적도가 증가함에 따라 층간 절연막의 두께가 줄어들어 RC delay현상이 발생한다. 또한 유연성에 대한 요구도 증가하고 있다. 그 대안으로 저유전 SiO₂ 무기물, 유무기 복합체, 유기물 등이 크게 각광받고 있다. 본 연구는 SiO₂ hollow sphere와 폴리이미드를 이용해 유무기복합체를 합성하고 유전율 측정 및 유연성 테스트를 진행한 내용을 담고있다. 먼저 폴리스티렌에 SiO₂를 코팅한 후 폴리이미드 용액과 기계적으로 혼합시킨다. 이후 스핀코팅 및 열처리를 이용해 한단계로 복합체를 합성할수 있다. 합성된 복합체의 유전율은 최소 1.6에 가까운 수치를 나타낸다.

Keywords: 반도체, 층간절연막, 유연성, 저유전율, 유무기복합체

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Improved Power Conversion Efficiency of Dye-Sensitized Solar Cells Assisted with phosphor materials Scattering layer

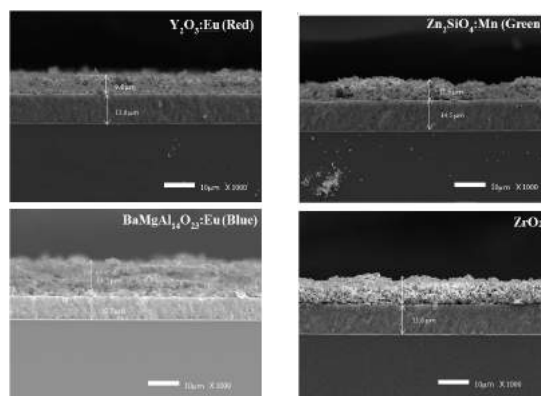
Yong-Min Lee¹, Hyun Ji Choi², Dong In Kim¹, Yul Hee Lee¹, Jung-Hoon Yu¹, Jee Yun Kim², Hyeon Jin Seo¹, Ki-Hwan Hwang², Sang Hun Nam², Jin-Hyo Boo^{1*}

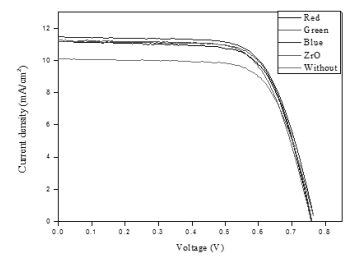
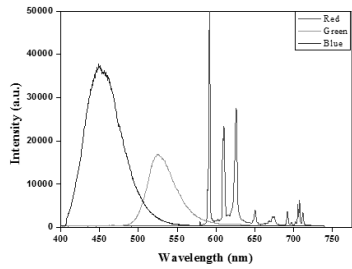
¹Department of Chemistry, Sungkyunkwan University, Suwon 440-746, South Korea

²Institute of Basic Science, Sungkyunkwan University, Suwon 440-746, South Korea

Theoretically, the dye-sensitized solar cells (DSSCs) are high efficiency solar cells. However DSSCs have low power conversion efficiency (PCE) than silicon based solar cells. In this study, we use the phosphor materials, such as Y₂O₃:Eu (Red), Zn₂SiO₄:Mn (Green), BaMgAl₁₄O₂₃:Eu (Blue), to enhance the PCE of DSSCs. Three phosphors were prepared and used as an effective scattering layer on the transparent TiO₂ with doctor blade method. We confirmed that the three scattering layers improve the PCE and Jsc due to the light harvesting enhancement via increased the scattering and absorbance in visible range. Under the sun illumination AM 1.5 conditions, the PCE of the mesoporous TiO₂ based DSSCs is 5.18 %. The PCE of the DSSCs with Y₂O₃:Eu, Zn₂SiO₄:Mn and BaMgAl₁₄O₂₃:Eu as scattering layer were enhanced to 5.66 %, 5.72% and 5.82%, respectively. In order to compare the optical properties change, DSSCs were measured by EQE, reflectance and PCE. At the same time, FE-SEM and XRD were used to confirm the structural changes of each layer.

Keywords: phosphor materials, dye-sensitized solar cells, down conversion effect





	Red	Green	Blue	ZrO ₂	Without
J _{sc} (mA/cm ²)	11.2	11.5	11.5	11.3	10.1
V _{oc} (V)	0.76	0.76	0.77	0.76	0.77
FF (%)	66.9	65.7	65.9	65.5	66.7
PCE (%)	5.66	5.72	5.82	5.61	5.18

