

Characteristics of Perovskite solar cell with carbon black: TiO₂ electron transfer layer

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Carbon black(CB) has excellent electrical properties and can show long-term stability when applied to most of devices. In this study, we confirmed the effect of Perovskite solar cell with 0.01wt% CB:TiO₂ electron transfer layer(ETL). Four types of the ETLs were fabricated, ① TiO₂/mesoporous(mp) TiO₂, ② CB:TiO₂/mp TiO₂, ③ TiO₂/CB:mp TiO₂, ④ CB:TiO₂/CB:mp TiO₂. Schematic of the device was FTO glass / TiO₂/mp TiO₂ ETL / Perovskite photoactive layer(AL) / spiro-OMeTAD hole transfer layer(HIL) / Ag. SEM imaging was used to confirm the morphology of ETLs, as a result all ETLs has porous surfaces. The chemical bonding of ETLs were confirmed by XPS, as a result Ti and O peak were same in all ETLs. The crystal structure of Perovskite AL was cubic, confirmed by XRD. The electrical characteristics of Perovskite solar cells were confirmed by solar simulator, TiO₂/CB:mp TiO₂ ETL device was the highest photoelectric conversion efficiency.