

### Characteristics of Perovskite solar cells with double electron transfer layer

안준섭, 송재관, 한은미<sup>†</sup>  
전남대학교  
(emhan@jnu.ac.kr<sup>†</sup>)

ZnO or Ti(OBu) was inserted between FTO electrode and mesoporous TiO<sub>2</sub> as a double electron transfer layer(ETL), to prevent direct contact between the Perovskite photoactive layer(AL) and the FTO electrode, and to increase the electron conductivity. The device structure is FTO / ZnO or Ti(OBu) / mesoporous TiO<sub>2</sub> / Perovskite(CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>) / spiro-OMeTAD / Ag. Morphology of the ZnO and Ti(OBu) ETL was confirmed as flat by SEM. It is considered that the double(ZnO or Ti(OBu) / mesoporous TiO<sub>2</sub>) ETL prevents direct contact with the Perovskite AL and FTO electrode. The chemical bonding of the ETLs were analyzed by XPS and XRD. From the peaks of XPS, ZnO and TiO<sub>2</sub>, anatase structure was confirmed by XRD in mesoporous TiO<sub>2</sub>. Electrical characteristics of Perovskite solar cells with double ETL were measured using solar simulator. As a result, photoelectric conversion efficiency of the perovskite solar cells with single(mesoporous TiO<sub>2</sub> or ZnO or Ti(OBu)) ETL were showed 7.4% efficiency on average. On the other hand, The ZnO / mesoporous TiO<sub>2</sub> ETL Perovskite solar cell showed the highest efficiency as 10.4%.