Double Layer Mesoscopic Electron Contact for Efficient Perovskite Solar Cells

Rohit Chavan, 홍창국[1,†]
chonnam national university gwangju; [1]교수
(hongck@chonnam.ac.kr[†])

Interface engineering has emerged as a great strategy for fabrication of high efficiency and stable perovskite solar cells (PSCs). Here, we deposit a thin layer of ZnS as a buffer layer at the interface of perovskite absorber and electron transporting layer (ETL) using atomic layer deposition (ALD) process. The impact of ZnS layer on photovoltaic characteristics of PSCs was investigated by comparison of the two mesoscopic configurations, in which the ZnS layer is grown on compact TiO_2 and on mesoporous TiO_2 surfaces. Our results revealed that the addition of an ultrathin ZnS layer between perovskite and ETL drastically improves the charge extraction property and reduces the interface recombination. Moreover, we demonstrate that the deposition of an optimum ZnS layer (with thickness of 1.8 nm) on top of mesoporous TiO_2 surface has the best effect on the improvement of photovoltaic performance of PSCs yielding a champion efficiency of 18.80% with negligible hysteresis. These results indicate that the interface engineering with the ZnS film deposited by ALD is an effective approach toward highly efficient and reproducible PSCs.