2D Perovskite as a Hole Transporting Material for Stable and Efficient Perovskite Solar Cells

Hobeom Kim(hobeom.kim@epfl.ch)[1], Mohammad K. Nazeeruddin[1], Hoichang Yang[2]

[1]École Polytechnique Fédérale de Lausanne, Sion, Switzerland, [2]Inha University, Incheon, Republic of Korea

Abstract

Metal-halide perovskite solar cells (PSCs) now achieved power conversion efficiency (PCE) of 24.2 %. Nevertheless, there has been still an issue in terms of long-term stability of PSCs. For example, the conventional organic hole transporting materials (HTMs) such as 2,2',7,7'-tetrakis-(N,N-di-p-methoxyphenyl-amine)-9,9'-spirobifuorene (spiro-OMeTAD) and polytriarylamine (PTAA) necessarily require additional dopants to improve their low hole mobility, but the incorporation of the dopants can accelerate degradation of the device. Here, we introduced 2-dimensional (2D) perovskite as an alternative HTM instead of the conventional HTMs. The device with 2D perovskite HTM achieved PCE of 15.0 %, which was greatly higher than that of the devices without a HTM. We attributed the improvement to the simultaneous role of the 2D perovskite as a HTM and a passivation layer. Furthermore, the device with the 2D perovskite HTM showed significantly increased operating lifetime compared to the device without 2D perovskite HTM owing to the stable nature of 2D perovskite.

Keywords: *Perovskite solar cells, 2D perovksite, Hole transporting materials*

Biography

Hobeom Kim received his Ph.D. (2017) in the Department of Materials Science and Engineering at Pohang University of Science and Technology (POSTECH), South Korea. After his post-doc in Seoul National University (SNU) (2017–2018), South Korea, he is currently working in Group for Molecular Engineering of Functional Materials (GMF), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland as a post-doc (2018-). His research now focuses on optoelectronic devices based on perovskite materials.