Inorganic Hole Transport Material for Inverted Planar Lead Halide Perovskite Solar Cells

M. Bodiul Islam [1,2], M. Yanagida [1], Y. Shirai [1] and K. Miyano [1]

[1] Global Research Center for Environment and Energy based on Nanomaterials Science (GREEN), National Institute for Materials Science, Japan

[2] Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi, Japan

E-mail: mbi@ruet.ac.bd

Using inorganic materials instead of organic materials as the hole transport layer (HTL) for perovskite solar cells can be a way to improve the stability of these solar cells. We have been developing the inorganic materials like NiO_x for improved properties as HTL. We found that the properties of perovskite solar cells with NiO_x HTL are very much dependent on the composition of NiO_x. And the composition of NiO_x can be easily controlled by changing the condition of sputter deposition, which is a cheap and easy method of thin film fabrication. The cell efficiency has been improved to 13.8% with good stability and reproducibility. The stability of the fabricated devices under continuous 1 SUN illumination at maximum power point tracking (MPPT) and under ambient in dark condition is presented in Fig.1. NiO_x HTL is a good candidate to solve some critical issues like reliability, reproducibility and stability of the lead halide perovskite solar cells.

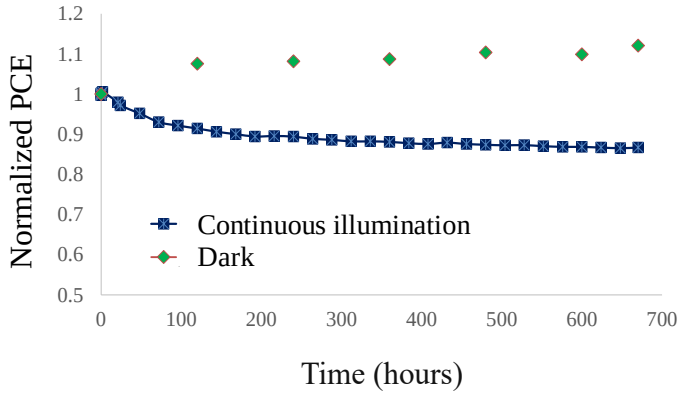

Fig.1: Stability of the device under MPPT condition (1 SUN) and under ambient in dark condition.