MNTC Seminar vol.45

Micro/Nano Technology Center Building 12

15 MONDAY JANUARY 2018
17:00 ~ 18:00

Dr. Md. Shahiduzzaman

Post-doc Researcher
Department of Chemistry,
School of Science,
Tokai University

Planar Heterojunction Perovskite Solar Cells fabricated by Wet and Dry Process

A precise control of the morphology and crystallization of perovskite thin-films is well-correlated to higher perovskite solar cells performances. Ionic liquids (ILs) can retard perovskite crystallization to aid the formation of films with uniform morphology to realize highly efficient perovskite solar cells. Herein, we attempt to control the nanostructural growth of CH3NH3PbI3 thin films by adding a small amount of ILs to the perovskite spin-coating solution and investigate the effect of IL viscosity on the resulting CH3NH3PbI3 nanoparticle (NP) thin films.

Interface engineering plays a promising strategy to produce efficient perovskite solar cells. The deep trap states on the compact-TiOx surface leading to a large leakage current and recombination of charge carriers. To solve the problems, interfacial engineering of electron collecting layer compact-TiOx by thin-layer of fullerene (C60) and N-phenyl [60]fulleropyrrolidines (PNP) are applied. The optimum thickness of C60 interlayer was 7 nm, for which a maximum PCE of 9.51% was obtained.

And, herein, we demonstrate a novel method to promote the intercalation control of inorganic cesium lead iodide (CsPbI3) perovskite thin-films via alternate vacuum-deposition. A PCE of 6.79% was obtained via two double layers alternating vacuum-deposition with a Jsc of 12.06 mA/cm2, Voc of 0.79 V, and FF of 0.72. Our results suggest a route for inorganic precursors to be used for efficient perovskite solar cells via alternating vacuum deposition.

Micro/Nano Technology Center, Tokai University
E-mail: mntc@tsc.u-tokai.ac.jp Phone: +81 (0)463 58 1211 ext. 4790

MEXT-Supported Program for the Strategic Research Foundation at Private Universities
"Developmet of next-generetion medical technologies using ultra-thin polymer films"
東海大学総合研究機構プロジェクト「人と街と太陽が調和する」創・送エネルギーシステムの開発