Department of Electrical and Computer Engineering

Fabrication of Perovskite Solar cell by Vapor Phase Process

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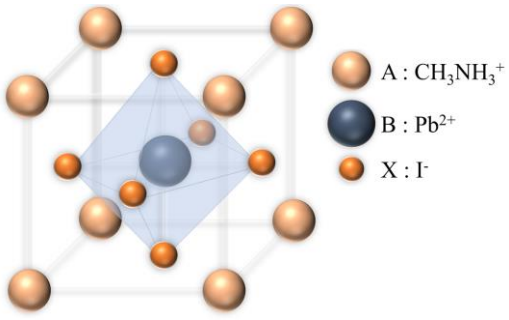
Research Outline

Characterization of Perovskite Films Prepared by Vapor Phase Process

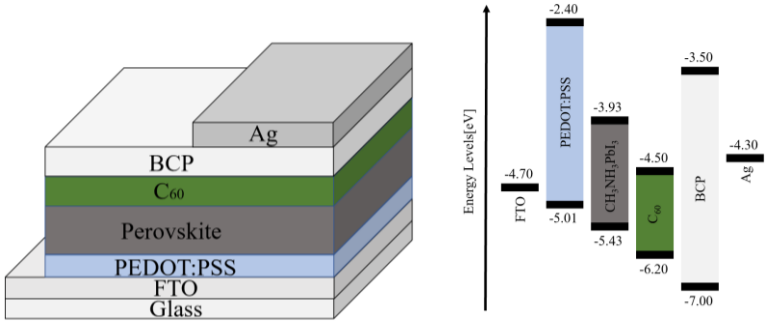
In the field of solar cells, which is one of the photoelectric conversion devices, many researchers in recent years have focused on hybrid organic-inorganic perovskite solar cells (PSCs). The reason for this was that the power conversion efficiency (PCE) has improved dramatically in a short period of time.

The liquid solution process has been widely used in many cases to fabricate perovskite films and PSCs. The liquid solution process, such as spin-coating, is a simple fabrication process with low equipment cost. On the other hand, processes using vapor deposition have been reported as an alternative fabrication process for perovskite films. The vapor deposition process has many advantages for such film fabrications such as precise control of the film thickness, and to avoid the use of the toxic solvents such as dimethylformamide (DMF) and dimethylsulfoxide (DMSO) during the deposition process.

The density and uniformity of the perovskite film, which is the light-harvesting layer, are considered to be important in further improving the efficiency of PSCs. Our research aims to improve the PCE of PSCs by controlling the grain size and grain boundary area using the vapor phase process.



Schematic of cubic perovskite structure.
(Example : $CH_3NH_3PbI_3$)



Schematic of perovskite solar cell and energy band diagram.