Enhanced Moisture Stability of Perovskite Solar Cells using the Facile Hydrophobic Passivation

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Recently, CH3NH3PbI3 perovskite has been one of the most promising materials for the absorber layer in solar cells. The perovskite has diverse advantages, such as a high absorption coefficient, a strong dipole moment causing rapid electron transport, an ideal band gap energy of ~1.5 eV, simple and various synthetic methods, the ability to transport the hole and the electron, and low cost of synthesis from solution processes.

In this research, a novel and facile passivation process for a perovskite solar cell is considered. Poor stability in ambient atmosphere, which is the most critical demerit of a perovskite solar cell, is overcome by a simple passivation process using a hydrophobic polymer layer. With the hydrophobic passivation, the perovskite solar cell shows negligible degradation after a 30-day-storage in ambient atmosphere. Suppressed degradation of the perovskite film is proved in various ways: X-ray diffraction, light absorption spectrum, and quartz crystal microbalance. This simple but effective passivation process suggests new kind of approach to enhance stability of perovskite solar cells to moisture.