Dependence of solvent on perovskite solar cell performances for anti-solvent method in high humidity air condition

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Abstract: The past decade has witnessed the boost improvement of solution-processed perovskite solar cells (PSCs), which are large-area, low-cost and up to 22.1% high performance.^{1,2,3} However, all materials and devices processing were conducted in a nitrogen-filled glovebox because of the instability, which is prone to disproportionation or oxidation when exposed to air and moisture. In order to solve this problem, effective anti-solvent using ethyl acetate is recently reported, which can be proceed even under the high humidity in air condition. Herein, we firstly utilize four kinds of acetate (methyl acetate, ethyl acetate, propyl acetate and butyl acetate) as anti-solvents in the humidity air condition. Compared to normal traditional anti-solvent like chlorobenzene, diethyl ether and toluene, pinholes-free, long-time stable and high quality MAPbI3 perovskite film under high humidity (60-70% relative humidity) is achieved with average high efficiency 16.3% and low hysteresis, which allows for low-cost, efficient and consistent device fabrication without glovebox.

References

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