Perovskite solar cells fabricated with blowing-free printing process based on 3D printer

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Organic-inorganic hybrid perovskite solar cells (PeSCs) have attracted tremendous attention in recent tears owing to their remarkable device performance over 25 % power conversion efficiency (PCE) and a potential for low cost manufacturing. Because efficiency is enough for use in commercial applications, other issues such as long-term stability and reliability of scalable fabrication process has emerged. Although devices with high PCE over 18% have been reported via scalable processes such as doctor blade and slot-die coating, air or N2 gas blowing technology is widely used in these processes to obtain uniform and pin-hole free perovskite layer. In this case, a precisely controlled flow in an optimized location is required and blowing parameter must be reoptimized according to the change of deposition parameters. Furthermore, the turbulence in large scale blowing system is considered as a critical issue in upscaling step.
Therefore, we have tried to develop a blowing-free printing process for reliable fabrication of PeSC. Effect of processing conditions such as precursor composition and solvent on the quality of perovskite layer and device performance will be discussed.