

## Blade coating 2D/3D Perovskites films for high efficiency and stable Perovskites solar cells

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### Abstract

In recent years, perovskite solar cells (PSCs) have developed rapidly. In order to commercialize, there are certain critical issues which have to be resolved such as the lack of stability when exposed to moisture, light, and heat. One of the solutions to improve stability is lower dimension (2D)  $(\text{CH}_3(\text{CH}_2)_3\text{NH}_3)_2\text{PbI}_4$  perovskite structure. The higher stability of the 2D-perovskite (PVSK) structure can be ascribed to the significant steric hindrance effect by these large size cations with long alkyl chains. Therefore, 2D-PVSK has larger band gap (2.24eV) than 3D-PVSK (1.52eV). It means 2D-PVSK will decrease absorption coefficient. To strike a balance between high power conversion efficiency and stability, we have to combine each advantage. In this study, we mix 2D/3D PVSK on different molar ratio, focus on optoelectronic properties of the film and photovoltaic performance of the device. And we combine blade-coating method which is easier to fabricate than the most commonly used spin-coating process. Finally, we successfully obtain a power conversion efficiency of 19% on 2D/3D PSCs, and 90% remains efficiency placed at RH 40% for 100 days. Overall, the 2D-PVSK define a promising class of stable and efficient light-absorbing materials.