

Improved performance of mesoscopic perovskite hybrid solar cells by one-step coating method with controlled crystallization

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Recently, it is of great interest to study the perovskite solar cells because of their unique properties such as high absorption coefficient by direct bandgap, convenient bandgap tunability by simple combination/mixing of materials, long diffusion length of charge carriers by long life time, high open circuit voltage by small exciton binding energy, and low temperature solution processibility. One of key technologies to attain high device efficiency is to rely on the formation of pinhole-free single crystalline thin-films during the coating process. The thin-film deposition methods can be roughly classified to solution and vapor deposition of which the former includes one-step and multi-step coating method and the latter includes dual source vapor deposition and vapor assisted solution process. Among them, one-step coating method seems the simplest process and has benefit to form single crystalline perovskite thin-film. Here, we deposited MAPbI₃ perovskite thin-films on mesoscopic titania electrode by one-step spin-coating method with controlled crystallization. Through the formation of pinhole-free perovskite thin-film with controlled morphology, we could improve the performance of mesoscopic perovskite solar cells.