Improved Efficiency and Stability of Quasi-2D Tin-Based Perovskite Solar Cells with Formamidinium Thiocyanate Additive

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Tin-based perovskite solar cells have been considered to be promising alternatives for toxic Pb-based perovskite solar cells due to their comparable optoelectronic properties as well as relatively lower toxicity. However, their poor oxidation stability has been a main obstacle for efficient tin-based perovskite solar cells. Herein, we fabricated quasi-2D tin-based perovskite solar cells with improved stability and studied the effects of formamidinium thiocyanate (FASCN) additive which can interact with Sn^{2+} ion to suppress oxidation. The carrier density of the device with FASCN was reduced to 6.67×1015 cm^{-3} from 2.17×1016 cm^{-3}. Moreover, morphological improvement was observed with FASCN. The best-performing sn-based perovskite solar cells showed the highest effciency of 8.17%, which retains over 90% of its initial efficiency over 1000 hours in a glovebox filled with nitrogen. These results demonstrate a viable approach for efficient tin-based perovskite solar cells.