Abstract Submitted
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Degradation of Co-evaporated Perovskite Thin Films[1] CONGCONG WANG, Univ of Rochester, YOUZHEN LI, XUEMEI XU, Central South University, CHENGGONG WANG, Univ of Rochester, FANGYAN XIE, Sun Yat-Sen University, YONGLI GAO, Univ of Rochester — Methylammonium lead halide perovskites have been developed as highly promising materials to fabricate efficient solar cells in the past few years. We have investigated degradation of co-evaporated $CH_3NH_3PbI_3$ films using x-ray photoelectron spectroscopy (XPS), small angle x-ray diffraction (XRD), and atomic force microscopy (AFM). The $CH_3NH_3PbI_3$ films have an excellent atomic ratio and crystal structure. The films were exposed to oxygen, air and water, respectively. The results indicate that $CH_3NH_3PbI_3$ film is not sensitive to oxygen and dry air. The XPS results of H_2O exposure are similar to those of ambient exposure except for the higher intensity of C and O. The XRD results indicate that the perovskite turned to PbI_2 after ambient exposure. The AFM measurements reveal that the morphology of the film changed drastically from smooth to rough by ambient exposure. The experiment indicated that H_2O plays a dominated role in the degradation of $CH_3NH_3PbI_3$ films. The degradation can be characterized by almost complete removal of N, substantial reduction of I, residual of PbI_2, C, O, and I compounds on the surface.

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