Supplementary Information

Evidence of Band Bending Induced by Hole Trapping at $MAPbI_3$ Perovskite/Metal Interface

Y.-F. Chen, Y.-T. Tsai, D. M. Bassani, R. Clerc, D. Forgács, H. J. Bolink, M. Wussler, W. Jaegermann, G. Wantz, and L. Hirsch**

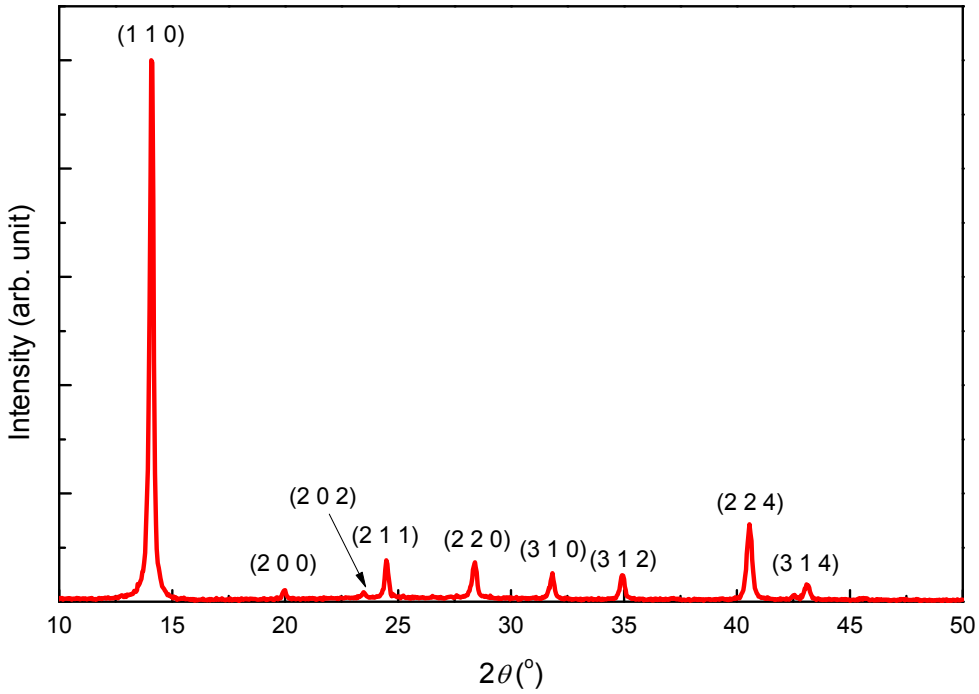

Figure S1. **X-ray diffraction spectrum of a 200-nm-thick $MAPbI_3$ film**

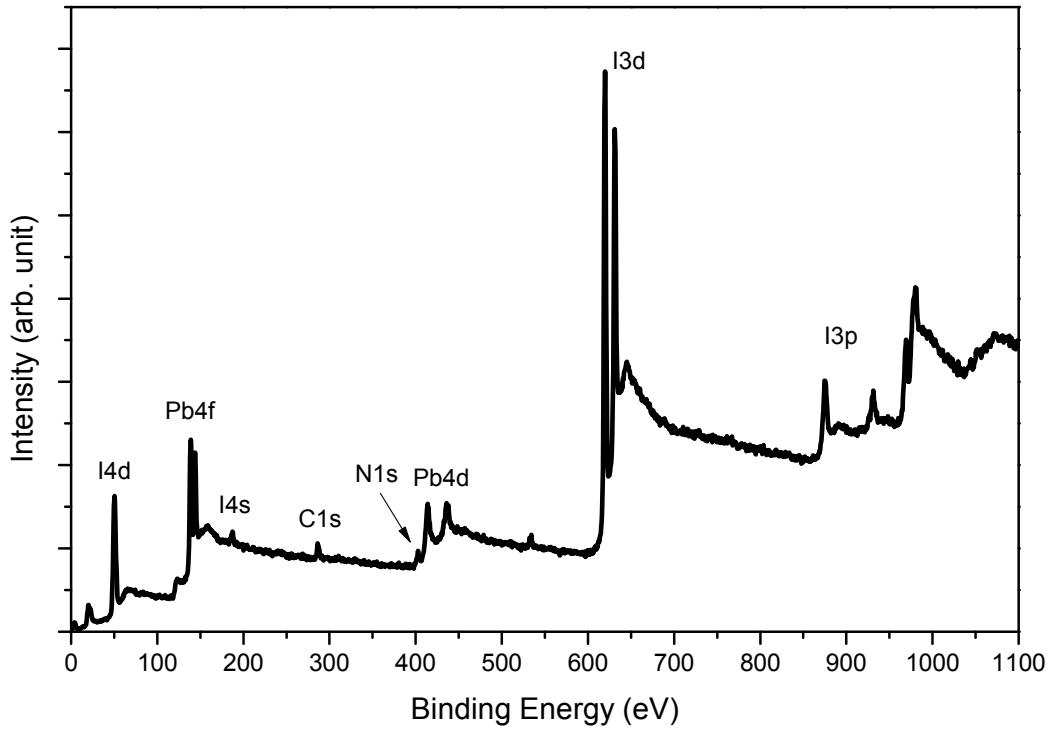

Figure S2. **X-ray photoemission spectrum of a 200-nm-thick $MAPbI_3$ film.** The stoichiometric composition of elements was estimated from peak heights to be C : N : Pb : I ~ 1 : 0.3 : 1 : 2.5. The lead and iodide ratio are consistent with the stoichiometry of the material, while the deviation of the nitrogen ratio might come from environmental contaminations.

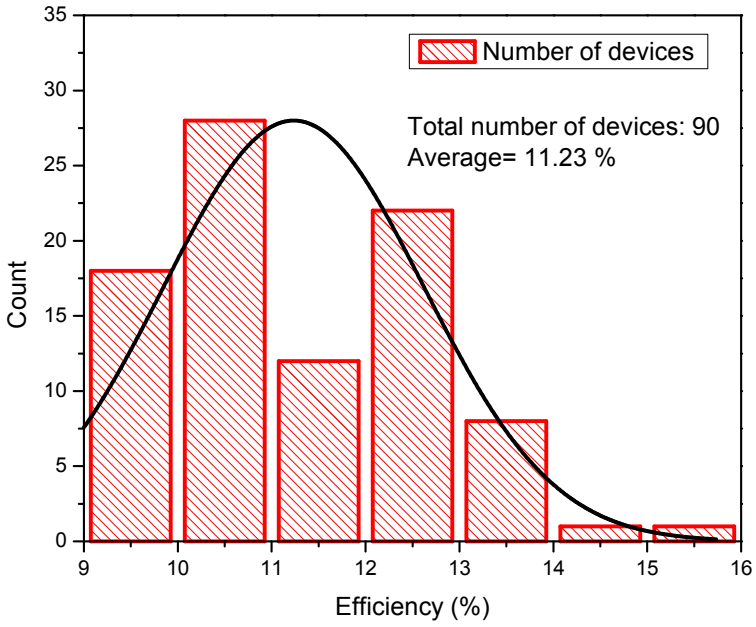

Figure S3. **ITO/PEDOT:PSS/MAPbI$_3$/PC$_{61}$BM/Ca/Al solar cell device statistics**

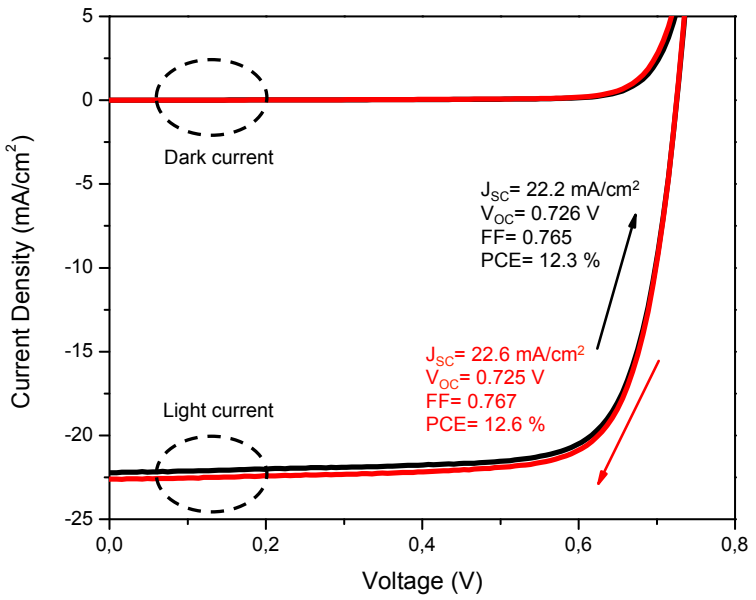

Figure S4. **Typical current–voltage characteristics of a typical ITO/PEDOT:PSS/MAPbI$_3$/PC$_{61}$BM/Ca/Al solar cell. The light current was measured under AM 1.5G condition.**

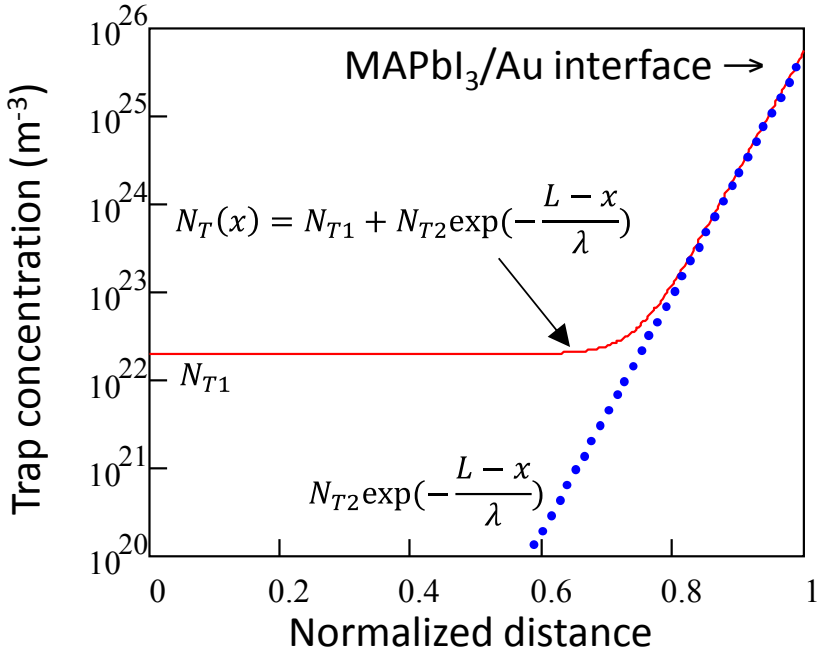

Figure S5. **Trap concentration versus normalized distance according Eq.(3), illustrating the impact of the volume traps (concentration N_{T1} = 2 10^{22} m^{-3}) and the interface traps (maximum value at x = t : N_{T2} = 6 10^{25} m^{-3}). λ = 6.5 nm.**

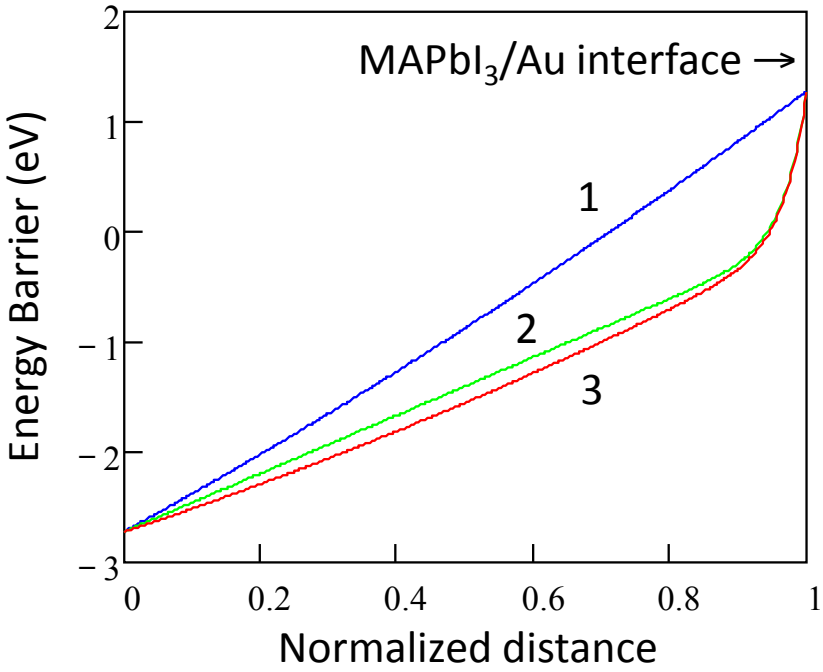

Figure S6. **Energy barrier according Eq. (7) 1 with volume traps only (N_{T1} = 5 10^{22} m^{-3}); 2 with interface traps only (N_{T2} = 6 10^{25} m^{-3}, λ = 6.5 nm); 3 with both.**

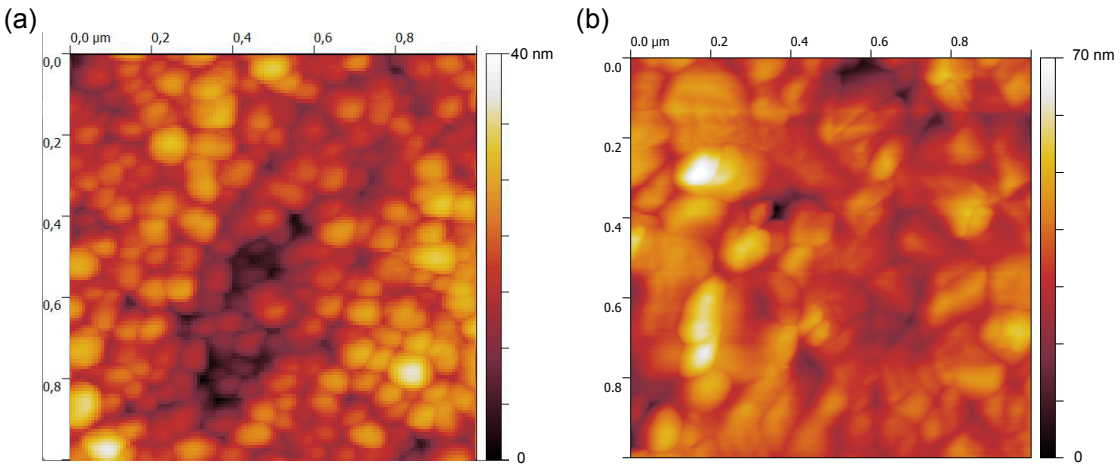

Figure S7. **AFM topography of $MAPbI_3$ film. (a) Film thickness 450 nm. (b) Film thickness 200 nm.**

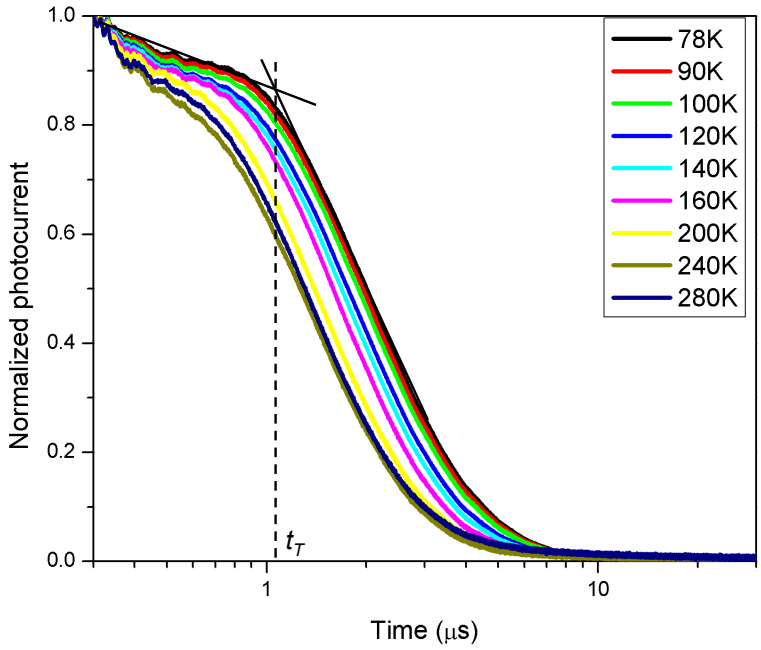

Figure S8. **Temperature dependent time of flight photocurrent of ITO/PEDOT:PSS/$MAPbI_3$/$PC_{61}BM$/Au at –3 V applied bias. The transit time t_T is determined by the intercept between the two slopes on the current patterns.**